Eighth Annual SO/LIC Symposium & Exhibition

"The Future of SOF in Coalition Operations: Policy, Training, Equipment Implications and a New Role for Industry" and Celebrating the Tenth Anniversary of the US Special Operations Command (USSOCOM)

PROCEEDINGS

Sponsored by the:
Special Operations/Low Intensity Conflict Division
of the
American Defense
Pr

February 11-13, 1997
Event # 788
The Renaissance Hotel

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EIGHTH ANNUAL SO/LIC SYMPOSIUM & EXHIBITION

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"Fire Ant & Lady-Bug, Stealthy High-Mobility Vehicles for transport by CV - 22" by Mr. S. V. Paul Dev, D-Star Engineering, Shelton, CT.

"Casper: The Ghostly Friend" by Mr. S. Paul Dev.

"Civil-Military Operations and Civil Affairs: A Version for the Future", by Major Tim Howle, USA, JFK Special Warfare Center.

"The Future of Simulations and Exercises for Special Operations Forces" by Mr. Kenneth E. Kaizer, Evedence Based Research (EBR), Vienna, VA..

"SOF 2020: First Force" by Lieutenant Colonel David MacNeil, USAF, USSOCOM (SOJ5)-05.

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"New Minitaure CW Detectors to Support Special Force Operations in a Chemical Environment" by Mr. Garry Murphy, Dr. H. Wohlthen and Dr. N.L. Jarvis, Microsensor Systems, Inc., Bowling Green, KY.

"Operation Provide Comfort Communications-A Precursor to SOF C4I Strategy" by Colonel John J. Myer III, USA, USSOCM (J-6).

"Below Line-of-Sight Threat Detection/Geolocation for Covert Infiltration/Exfiltration" by Mr. William F. Santiff, Amecom Division, Litton Systems, Inc., College Park, MD.

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Contracting for Military Operations Support, by Mr. Edward G. Elgart, Director, CECOM Acquisition Center.

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Panelists: *Lieutenant General Peter Schoomaker*, USA, Commanding General, US Army Special Operations Command.
Colonel Eugene Ronsick, USAF, Director of Staff, US Air Force Special Operations Command.
Rear Admiral Thomas R. Richards, USN, Commander, NAVSPECWARCOM.
Major General Michael A. Canavan, US Army, Commander, Joint Special Operations Command (JSOC).

Eighth Annual
Special Operations/Low Intensity Conflict
(SO/LIC)
Symposium and Exhibition

"The Future of SOF in Coalition Operations:
Policy, Training, Equipment Implications and a New Role for Industry"

Overview

The Eighth Annual Special Operations/Low Intensity Conflict (SO/LIC) Symposium and Exhibition will continue the objective of providing timely policy, operational and technical information to the Special Operations professional community. These symposia intend to focus on specific issues of current importance in the SO/LIC component of our national security program and raise the awareness of these issues with all sharing a concern for Special Operations Forces and National Defense. This forum provides the opportunity for attendees to hear presentations by, and participate in discussions with, members of government, industry and academia who have responsibility for the effectiveness of SO/LIC policy, forces and operations.

This year's symposium will focus on future SOF global mission requirements in coalition operations and the increased supporting role required from industry.

In addition to the important keynote addresses by the Assistant Secretary of Defense, Special Operations and Low Intensity Conflict, and the Commander-in-Chief, US Special Operations Command, two plenary sessions are planned. The first will address **"The Character of Coalition Operations"** while the second will emphasize the use of **"Special Operations Forces in Coalition Operations."** Particular attention will be given to understanding SOF requirements for supporting the United Nations (UN) and North Atlantic Treaty Organization (NATO) peacekeeping, peacemaking, and humanitarian operations. A subset of the second plenary session will address the expanding role of industry to support SOF "on-the-ground" with services previously provided by military agencies. This type of "out-sourcing" will require the same quality of integration of the SOF/Industry team that has proven so successful in building our technically superior SOF. To address the emerging new operational support role for industry will be a panel of industry leaders representing both the technology and service business sectors. Complementing this discussion will be a presentation from the Department of Defense on **"The Military/Industry Integration in Support of Future SOF Operations."**

The input to this year's Symposium has been expanded to include a Call for Papers in six areas of concern relating to SOF and future coalition operations. Selected papers will be presented in topical seminars by the authors and then discussed by a panel of respective functional experts from government on the following six areas-all extremely relevant to future SOF roles, missions, and operations:

Maintaining Readiness for Stated SOF Missions
Future SOF Mobility Requirements
War in the Information Age -C4I in Coalition Operations
Support from Industry During Coalition Operations
Humanitarian Operations -SOF Role
Preparing (Modernizing) SOF for the Future

This Symposium will be dedicated to the Soldiers, Sailors, Airmen, Marines and Civilians assigned to and in support of the U.S. Special Operations Command (USSOCOM) in celebration of their Tenth Anniversary. Special recognition will be given at the Awards Banquet to selected members of USSOCOM for their achievement in accomplishing the missions of the Command. The Symposium will be concluded with a panel - The Command Perspective - convened from the Commanders or their representatives of all USSOCOM major subordinate commands to address their key issues, concerns, and requirements necessary to maintain SOF in the leading edge of our national security forces.

For everyone associated with or interested in SO/LIC and SOF, this is another "don't miss" event - A chance to discuss the issues with the leaders.

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"The Future of SOF in Coalition Operations: Policy, Training, Equipment Implications and a New Role for Industry"
and
Celebrating the Tenth Anniversary of the US Special Operations Command (USSOCOM)

Two Plenary Sessions:

- The Character of Coalition Operations
- Special Operations Forces in Coalition Operations

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Two Keynote Speakers

Day One:
Key Speaker: The Honorable H. Allen Holmes
Assistant Secretary of Defense, Special Operations and Low Intensity Conflict (SO/LIC)

Day Two:
Key Speaker: General Henry H. Shelton, USA
Commander in Chief, US Special Operations Command (USSOCOM)

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Special Address

Special Operations Forces in Coalition Operations

- State of SOF Planning and Policy
- Key SOF Concerns and Issues in the Conduct of Coalition Operations
- Opportunities and Risks Associated With the Increased OPTEMPO

Keynote Speaker: The Honorable H. Allen Holmes
Assistant Secretary of Defense
Special Operations and Low Intensity Conflict

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Special Address

The Asymmetrical Threat, Coalition Operations, and Other National Security Realities - Implications for SOF

Key Featured Speaker: Lieutenant General Patrick M. Hughes, USA
Director, Defense Intelligence Agency (DIA)

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Plenary Session #1

The Character of Coalition Operations

- Understand How SOF Supports Regional CINCS in Coalition Operations
- Recognize Key Concerns and Issues
- Consider Opportunities and Technology Risks

Moderator: **Lieutenant General Joseph Kinzer, USA**
Commanding General, US Fifth Army

Panelists:

Brigadier General Norton Schwartz, USAF - Commander, 16th Special Operations Wing
Brigadier General Phillip R. Kensinger, Jr., USA - Deputy Commanding General, USASOC
Brigadier General Thomas Matthews, USAR - Commander, 353rd Civil Affairs Command

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Special Address

Coalition Warfare in Southern Europe

- Command Perspective of Operation Joint Endeavour, Operation Sharp Guard, Operation Deny Flight, and Operation Deliberate Force
- Implications for the Future

Featured Speaker: Admiral Leighton W. Smith, USN (Ret.)
Former Commander, Implementation Forces (IFOR), CINCUSNAVEUR, CINC Allied Forces Southern Command (AFSOUTH), Combined Joint Task Force Provide Promise

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Special Seminars

Panel 1

Maintaining Readiness For Stated SOF Missions - Do Military Operations Other Than War Degrade Capabilities?

Moderator: Colonel George Talbot, USA (Ret.)
Vice-President, Star Food Processing

Featured Speakers:

"The Use of Electronic Performance Support Systems by SOF in the Field"
Mr. Ricardo Gonzalez - Essex Corporation

"Special Operations Forces and Readiness"
Mr. Chris Simmons - Special Operation Council

"Maintaining SOF Readiness"
Lieutenant Commander Barry Dykes, USN,
USSOCOM (SOJ3 - Training)

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Special Seminars

Panel 2

Future SOF Mobility Requirements - What Will Drive the Requirements?

Moderator: Colonel Tim Davidson, USAF (Ret.)
Davidson Consulting

Featured Speakers:

"The Impact of the CV-22 on Future SOF Mobility Requirements"
Lieutenant Colonel Raymond A. Kruelskie, USAF, USSOCOM (J7-R)

"Development of High Mobility Ground Vehicles Internally Transportable by the V-22 Aircraft"
Mr. Michael A. Gallagher - Naval Surface Warfare Center - Carderock

"C-17 Globemaster III in the Special Operations World"
Mr. James C. Schaffer and
Mr. Leonard R. Tavernetti -
McDonnell Douglas Corporation

"Future SOF Mobility Requirements"
Major Ronald F. Richard, USAF
AFSOC/XPP

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Special Seminars

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C41 In Coalition Operations - Inter-Operability Problems With Joint and Combined Operations?

Moderator: Colonel Albert DePropero, USA (Ret.)
ADG

Featured Speakers:

"Special Operations Forces C3I in Operations Other Than War"
Mr. Rick Layton
Evidence Based Research. Inc.

"A New Role for a Strategic Nuclear Asset - C3 Support for SO/LIC and Tactical Operations"
Mr. Charles M. Smith and Dr. John G. Wilson, The Mitre Corporation

"Datum Matching: The Achille's Heel of Advanced Navigation Systems for SOF"
Major John Blitch, USA
USSOCOM (SOJ7-C)

"Advancing SOF C4I Concepts in a Coalition Environment"
Mr. James W. Cluck
USSOCOM (SOAC-C4I)

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Special Seminars

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Support for Coalition - How to Do It, What is Needed From DoD/Industry?

Moderator: Major Adrian Bogart, MDARNG

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"Managing Open Source Information in a SOF/Coalition Environment"
Mr. Ralph A. Lowenthal
Marine Corps Research Center

"The Use of Electric Performance Support Systems by Special Operations Forces in the Field"
Ms. Molly M. Kyne - Essex Corporation

"Coalition Doctrines for Peace Operations and Humanitarian Assistance"
Mr. James J. Landon
Evidence Based Research

"Guise vs. Gadgets; The Case for SOF Overwatch in Robot Assisted Reconnaissance"
Major John G. Blitch, USA
USSOCOM (SOJ7-CS)

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Special Seminars

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Moderator: Lieutenant Colonel Mike Janay, USMC (Ret.)
AFM-USA, Inc.

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"Special Operations Forces (SOF) Support to Humanitarian Operations"
Captain William J. Bender, USA
USSOCOM (SOJ5-O)

"Same Country - Different Worlds"
Ms. Lisa Witzig Davidson
Evidence Based Research

"Cost and Effectiveness Modeling For Humanitarian Mine Clearing Operations"
Mr. Steven M. Buc
SAA International, Ltd.

"Demining Projects in the DoD"
Mr. Harry Hambrie
Humanitarian Demining Project Leader
US Army CECOM RDC

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Special Seminars

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Preparing (Modernizing) SOF for Future Operations - Maintaining US Superiority. How Do We Keep SOF on the Leading Edge? The O & M and Modernization Funding Dilemma.

Moderator: Colonel Paul Churchill Hutton, III, USA (Ret.)
Dyn Meridian Corp.

Featured Speakers:

"Into the Future: Modernizing SOF and Acquisition Support"
Colonel Kenneth W. Getty, Jr., USA (Ret.) and Colonel Bruce D. Mills, USAF (Ret.) - Sverdrup Technology, Inc.

"Unmanned Aerial Vehicles for Special Operations Forces: Are They Worth It?"
Major Stephen P. Howard, USAF
USSOCOM (CinC's Staff Group)

"US Special Forces and the Environment "
Ms. Laurie MacNamara and
Mr. Brian Smith
Evidence Based Research

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SO/LIC Awards Banquet

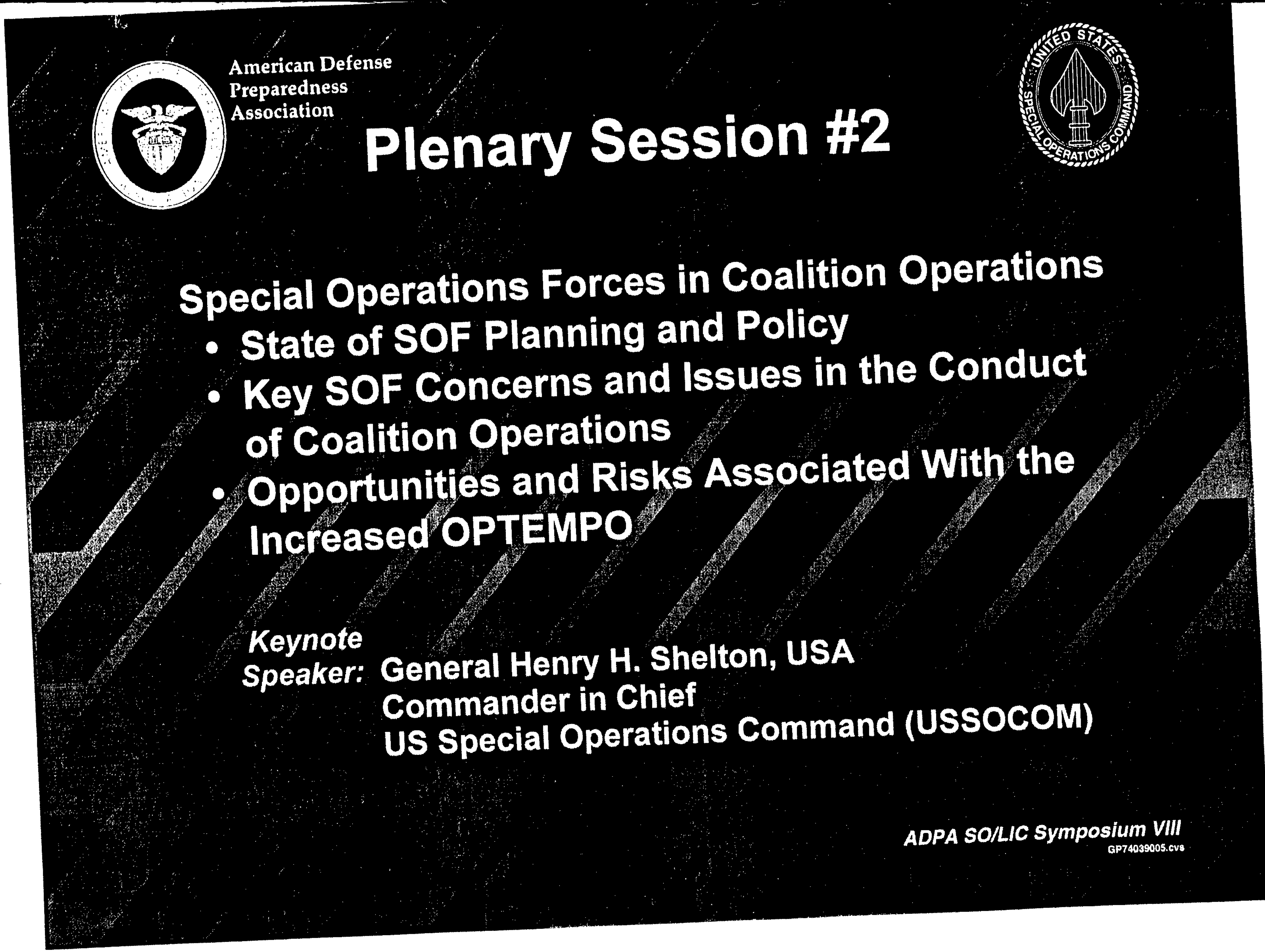
Prelude: Presentation of Colors

Invocation

Dinner

Master of Ceremonies:
Major General William C. Moore, USA (Ret.)

Key Speaker:
Lieutenant General Samuel V. Wilson, USA (Ret.)
President, Hampden-Sydney College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Plenary Session #2
UNITED STATES SPECIAL OPERATIONS COMMAND
Special Operations Forces in Coalition Operations
• State of SOF Planning and Policy
• Key SOF Concerns and Issues in the Conduct of Coalition Operations
• Opportunities and Risks Associated With the Increased OPTEMPO
Keynote Speaker: General Henry H. Shelton, USA
Commander in Chief
US Special Operations Command (USSOCOM)
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Special Address

Military/Industry Integration in Support of Future SOF Operations

- Technology Objectives
- Contracting for Military Operations Support
- Joint Communications/Electronics/Sensors/ Information Systems Acquisition
- Future Acquisition Trends

Featured Speaker: Mr. Edward G. Elgart
Director
CECOM Acquisition Center

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Special Address

Special Operations Forces in Coalition Operations

- State of SOF Planning and Policy
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Keynote Speaker: The Honorable H. Allen Holmes
Assistant Secretary of Defense
Special Operations and Low Intensity Conflict

ASD H. Allen Holmes

"The Future of SOF in Coalition Operations:
Policy, Training, Equipment Implications
and a New Role for Industry"

American Defense Preparedness Association

Washington, DC

February 12, 1997

General Skibbie, General Moore, Colonel Henderson, and all the participants of this symposium, I am honored to join you this morning to address the "Future of Special Operations Forces in Coalition Operations." I would like to commend ADPA for once again assembling a very impressive group of experts and strategic thinkers to discuss an issue of critical importance to our national security. It is always a pleasure for me to participate in this very valuable and insightful symposium.

It is a special privilege this year as we celebrate the anniversary of the Nunn-Cohen Amendment. Ten years ago, the Nunn-Cohen Amendment reorganized and revitalized the special operations capabilities of the Department of Defense. The special operations reforms were critically needed when they were enacted by the Congress in November 1986. But the foresight of that legislation is even more apparent today. Around the world, American security and American interests are increasingly being challenged in unconventional ways.

Our new Secretary of Defense, Bill Cohen, is no stranger to the Special Operations community. In January 1986, as a member of the Senate Armed Services Committee, he said that because special operations "lack an effective voice within the system, the unique needs and capabilities of SOF are often overlooked."

Cohen argued that "we must take immediate steps to repair a flawed organizational structure that leaves SOF at the mercy of interservice rivalries and a military bureaucracy in which support for special operations runs counter to mainstream thought and careers."

On May 15, 1986, then-Senator Cohen introduced an amendment, co-sponsored by Senator Sam Nunn, to the Goldwater-Nichols DoD Reorganization Act of 1986. The Nunn-Cohen Amendment became law on November 14, 1986 despite Pentagon objections.

As a result of that legislation, the U.S. Special Operations Command was established in April 1987. As you well know, SOCOM is dedicated to the preparation of Special Operations Forces for assigned missions around the world. The Army, Navy and Air Force have well-established component commands for their Special Operations Forces. And the unified theater commands all have Special Operations Commands – which are increasingly capable and engaged.

The Nunn-Cohen Amendment also established my office at the Pentagon as the policy and resource focal point for all special operations and low-intensity conflict activities of the Defense Department. We also have a separate funding category for Special Operations Forces, Major Force Program-11, in the defense budget – a major innovation, without which I doubt we would be where we are today. Aided by these reforms, considerable improvements in the readiness and capabilities of our Special Operations Forces have been made in recent years.

Because of the foresight of Senators Bill Cohen and Sam Nunn, among others, U.S. Special Operations Forces are well-positioned to play a vital role into the new millennium. At the same time, we are confronting a time of uncertainty, and I believe there is a great deal more Special Operations Forces can do. SOF have an important role to play in protecting and promoting American interests in a dangerous and uncertain world. Our challenge is to ensure that we are ready for the critical – and increasingly unconventional missions – that we are certain to be assigned.

Since the end of the Cold War, world events have been dominated by the quest for freedom and democracy. The startling changes in Eastern Europe, for example, are testimony to the power of those ideas. We have seen that the spark of freedom cannot be extinguished by decades of oppression.

Democracy and freedom are the foundations of our Republic and we recognize that our nation is enriched when other countries are similarly free. Thus, helping others to develop democratic societies is, and consistently has been, one of our fundamental national security objectives. That task remains.

Unfortunately, the promise of freedom remains unfulfilled in much of the Third World. Poverty persists. Post-colonial governments, not benefiting from our 200-year tradition of democracy, are still evolving and searching for a means of effective governance. Centuries-old ethnic and religious animosities and border disputes remain unresolved. Some seek power or wealth for its own sake, without regard for the chaos they inflict. Now, as before, the role of the United States in the world is to safeguard and strengthen the community of democracies and of open markets.

Drug trafficking is an open international sore, and a more than $300 billion a year business. Drug cartels today have financial resources that rival those of many nations. They have extended their infrastructure throughout the globe and have proven themselves adept at international scale clandestine logistics and at undermining legitimate governments through intimidation and corruption.

In Colombia, drug gangs continue to murder and intimidate government officials in a brazen attempt to paralyze the democratic process and cripple the judicial system. And increasingly, largely as a matter of convenience, the drug traffickers are joining in mutual support with Third World insurgent and terrorist groups.

Events of the past year, by themselves, provide clear evidence that terrorism is, and will remain, a fact of life in international politics. Iran, Iraq, Syria, Libya and other radical regimes continue to harbor and nurture international terrorist organizations. At the same time, new movements (not necessarily sponsored by nation-states), new ideologies and new opportunities for terrorism are emerging in Europe, the Middle East, Asia, Latin America and Africa. And given America's worldwide diplomatic, economic and military interests and commitment to the pursuit of peace, freedom and democracy, it seems likely that American citizens abroad will continue to be targets. For those of us in the business of combatting terrorism, the most difficult aspect of our war against terrorism is that the front is everywhere.

Despite reduced Superpower tensions and past efforts, freedom and democracy are under attack in the Third World. And they will not be secured by good intentions or wishful thinking. Achieving a free, peaceful world will require appropriate action on our part. That action clearly will involve Special Operations Forces. But the way in which SOF is to be involved is something we need to consider very carefully.

Many of these challenges will continue to be addressed through the use of Special Operations Forces . . . typically in collaboration with our friends and allies. For example, to counter the scourge of drugs, today's SOF train host nation counterdrug forces on critical skills required to conduct small unit CD operations in order to detect, monitor and counter the production, trafficking, and use of illegal drugs. To combat terrorism, our teams work with host nation forces to help prevent terrorist acts as well as, when directed, conduct offensive measures to deter and resolve terrorist incidents.

Too often overlooked in our deliberations on the Third World is the need to engage Special Operations Forces in non-traditional operations – missions like Foreign Internal Defense, Psychological Operations and Humanitarian Demining.

The outlook – the mindset – that focuses exclusively or predominantly on the use of force is pervasive and traditional. Clearly, the use of force is at times necessary to create the stable environment in which freedom and democracy can evolve and mature. It is not, however, sufficient. It does not address the role Special Operations Forces can play, in conjunction with conventional forces, in nurturing democratic institutions so that our friends can achieve stability and move beyond to the peace and prosperity such an environment brings.

Foreign internal defense has many facets. Bilateral training, for example, can promote respect for human rights and support for democracy among the host country military while improving military capabilities. Humanitarian assistance, civic action and other civil-military operations have become significant missions for the Defense Department. They address the grinding impact of poverty and disaster. They help friendly governments provide for basic human needs and promote the perception and reality of effective government on which stability rests.

Such actions are bolstered by Civil Affairs operations that help in the development of governmental and societal infrastructure. Our military forces are also being called upon to perform important post-conflict activities to stabilize an area following tactical operations, help to jump start a non-functioning or non-existent government, and facilitate an effective transition or responsibilities to other US government agencies or international organizations.

Psychological Operations contribute by getting the story out, by telling the truth. For a government besieged by conflict, it is critical that the citizenry understand and support its goals and values and, conversely, that the population recognizes the deceit spread by those who seek to destabilize.

In my view, the predominant use of PSYOP for the foreseeable future will continue to be in low-intensity conflict situations. Political objectives are dominant in LIC and the most important political objectives are winning the support of the populace and increasing legitimacy. Given this situation, you can see the important role of an information campaign in a LIC situation to: explain the government's policy to the people to foster their support; strengthen support for government institutions; counter the disinformation efforts of opponents; and discredit the ideology of opponents.

Recent experience in the Gulf, Haiti and Bosnia have demonstrated the necessity of closely integrating Special Operations Forces with combat and combat support forces. Traditional SOF, as well as Civil Affairs and Psychological Operations forces acting in direct support, greatly enhanced conventional combat force effectiveness and helped ensure that the political objectives of operations DESERT STORM, UPHOLD DEMOCRACY and JOINT ENDEAVOR were achieved.

During Operation DESERT STORM, SOF supported a major coalition combat operation for the first time since their reconstitution. In addition to daring SOF missions deep in Iraqi territory, Special Forces from the 5th Group, specially trained in the language and culture of our coalition partners, made up Coalition Support Teams. These teams served as coalition liaison officers and translators between U.S. and allied forces. This facilitated critical command and control. SOF do not win wars alone – they are a significant force multiplier. Their courage and skills demonstrated this fact time and again in the Gulf War.

Throughout Operation DESERT STORM, Psychological Operations were critical to achieving military objectives. But the psychological preparation of the battlefield began in earnest in December and radio, leaflet and loudspeaker operations continued throughout the air and ground phases of the conflict. In the post-conflict stage of DESERT STORM, Civil Affairs personnel provided many government services until the Kuwaiti civilian government could reestablish its authority.

Military operations in Haiti exemplified the unique and extraordinary role of Special Operations Forces as warrior-diplomats. Brigadier General Dick Potter, a member of the ADPA SO/LIC executive board and a panel chairman here with us today, led the coalition special operations force from subduing Haitians bewitched by voodoo, to delivering babies, seizing weapons caches, preventing Haitian-on-Haitian violence, and jump-starting the reconstruction of many communities. These Special Forces soldiers became heroes to many Haitian citizens.

Civil Affairs soldiers, in addition to accompanying almost every Special Forces detachment into the countryside, served as expert advisors to 12 government ministries. And Psychological Operations units proved their invaluable contribution to politico-military operations by broadcasting messages, in Creole, of Aristide's peaceful return to power.

Special Operations Forces provide great leverage to the coalition force as we jointly worked to bring peace to the troubled Bosnia-Herzegovina region. We all remember the dramatic bridging operation to cross the Sava river that occurred last winter. Many, however, do not realize that the first combat forces in the water were U.S. Navy SEALs who searched for unexploded ordnance and other underwater hazards.

Psychological Operations contributed enormously to the military and political objectives of Operation JOINT ENDEAVOR. PSYOP personnel write, print and distribute a weekly newspaper, the *Herald of Peace*, to 100,000 citizens in the British, French and U.S. sectors of Bosnia. They also produce radio broadcasts and distribute posters and leaflets that reinforce our objectives. PSYOP messages have underlined the impartiality of the Stabilizing Force, SFOR; encouraged citizens to support recent democratic elections; and provided valuable safety announcements. One which you may have seen is the popular Superman comic that explain to children the danger of landmines and other unexploded ordnance.

Among SOF's collateral missions that has received considerable attention in recent days is humanitarian demining. Civil war has raged for over a generation in countries like Cambodia, Eritrea, Ethiopia and Rwanda, and they are now groping to establish a national identity, with economic development and education as goals for their people. But they're finding this difficult to accomplish when so much of their arable land is littered with dangerous antipersonnel land mines.

The anti-personnel landmine crisis has taken an enormous toll on populations and governments around the world. The failure of a country to address the proliferation of anti-personnel landmines, beyond the obvious personal suffering, denies farmers use of their fields which stymies the resumption of agricultural production, denies access to markets, reduces public confidence in fledgling new governments and creates many other hurdles for a nation trying to heal the wounds of war. So, beyond the injuries inflicted and the medical expenses incurred, anti-personnel landmine fields drive whole societies into helpless, destitute poverty with no obvious way out.

Demining is one of the most fundamental humanitarian missions that the United States – and Special Operations Forces – can be involved in. The goal of our demining effort is to help countries establish long-term indigenous infrastructures capable of educating the population to protect themselves from landmines, eliminating the hazards posed by landmines and returning mined land to its previous condition.

The program assists the host country in development of all aspects of mine awareness and mine clearance procedures, with the caveat that no U.S. personnel will clear landmines or enter active minefields. Under the auspices of my office, DoD is pursuing a vital role in humanitarian demining while improving the readiness of U.S. forces through the unique training opportunities and regional access afforded by demining activities.

Special operations forces are the primary U.S. military resource for the training programs. Civil Affairs units play a key role in developing indigenous demining entities and helping them to develop sustainable long-term programs. PSYOP personnel conduct mine awareness programs which educate populations in affected areas regarding the dangers of landmines, what they look like, and what to do if a landmine is located. Special Forces units train host country nationals to train others in their country to locate landmines, to mark fields and to destroy the mines strewn indiscriminately on key roads, in villages and in fields.

The Defense Department has undertaken a substantial program for the development of mine-detection and mine-clearing technology, which we share with the broader international community. The ultimate goal is to place demining equipment in the hands of indigenous deminers, non-government organizations and contractors specializing in demining.

In Fiscal Year 1995, DoD began a $10 million dollar research and development program to develop simple, inexpensive, equipment for locating and clearing minefields, and for detecting, marking, recording, reporting and destroying individual landmines. Congress appropriated $14.7 million for the program in Fiscal Year 1997, in an effort to expand research and development.

All this is non-violent, non-traditional, and as I noted earlier, too often overlooked. The simple fact is that our conventional forces cannot be everywhere. They can't fight all of the drug runners, insurgents, terrorists and the many others who, for political or profit motive, seek to undermine free and democratic societies. And conventional forces are often not the most appropriate forces for mission areas like Foreign Internal Defense, Humanitarian Demining, Civil Affairs or Psychological Operations.

SOF is also becoming the force of choice for new missions such as countering the spread of Weapons of Mass Destruction as well as certain activities which support Information Warfare. But, as I have already mentioned, the way in which we employ SOF is something we need to consider very carefully.

- Does SOF focus too much on the high end of the low-intensity conflict spectrum?

- Do we provide military capabilities not available elsewhere in the armed forces? Information warfare and counterproliferation will require that we lead in technology exploitation.

- Are we adequately prepared to find, track and neutralize an adversary's WMD capability?

- Will we be able to sustain or develop capabilities to complement those of the Services and other agencies?

- Does SOF sufficiently emphasize foreign language and cultural sensitivity training?

- Do we adequately focus on Civil Affairs and Psychological Operations?

- Before an operation begins, do we consider the post-conflict environment? Do we understand what a society is going to look like after we achieve our objectives and before we can withdraw our military troops?

- Do we properly gauge the time when we should withdraw, leaving the host country to take full charge of its destiny?

- In other words, is SOF prepared as well as it could be for the new world we are going to see in the decade ahead?

The rise in international terrorism, the increase in worldwide drug trafficking, and the challenge of humanitarian crises, among others, present a number of unique challenges, not the least of which is funding. We have to recognize that operating within a tighter budgetary environment will require us to avoid high-cost solutions and to seek greater international cooperation.

In such an atmosphere, our Armed Forces inevitably will be restructured . . . and SOF will be in even greater demand than ever. How best to handle the dangers and opportunities of the post-Cold War era has been – and continues to be – intensively examined by the Department of Defense.

We are currently reviewing the appropriate force size and structure to meet the challenges this country will face in the next century. This Quadrennial Defense Review is ongoing and we should see the results of this analysis later in the Spring. I am confident SOF will continue to serve as a force multiplier for the conventional forces well into the next century.

CONCLUSION

Like the special operations forces of yesteryear, today's SOF face unusual challenges. Special Operations Forces must adjust to the non-traditional challenges we face and will continue to face in the future. SOF has always worked closely with our coalition partners and will continue to do so. In the future, more so than ever. Industry must account for a new environment as well.

To be prepared to make SOF's invaluable contributions to fighting and winning the nation's wars, to be capable of a range of challenging contingency operations, and to be ready to assist our friends and allies in the Third World in establishing a secure environment, we must continuously develop new tactics and equipment that address the New Age warfare we will face in the 21st Century. Innovation, skill and audacity are hallmarks of Special Operations Forces. Yes, we are asking a lot of SOF in the next century. But they have a lot to offer.

The years ahead will be a time of testing for SOF. Pressure on the Defense budget will place a premium on adaptability and willingness to change. I am confident, however, that today's Special Operations Forces have the creativity, adaptability and professional skills to tackle new, unconventional tasks and that SOF will emerge in the coming decade strong, with renewed sense of purpose in a changing world. Thank you.

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Special Address

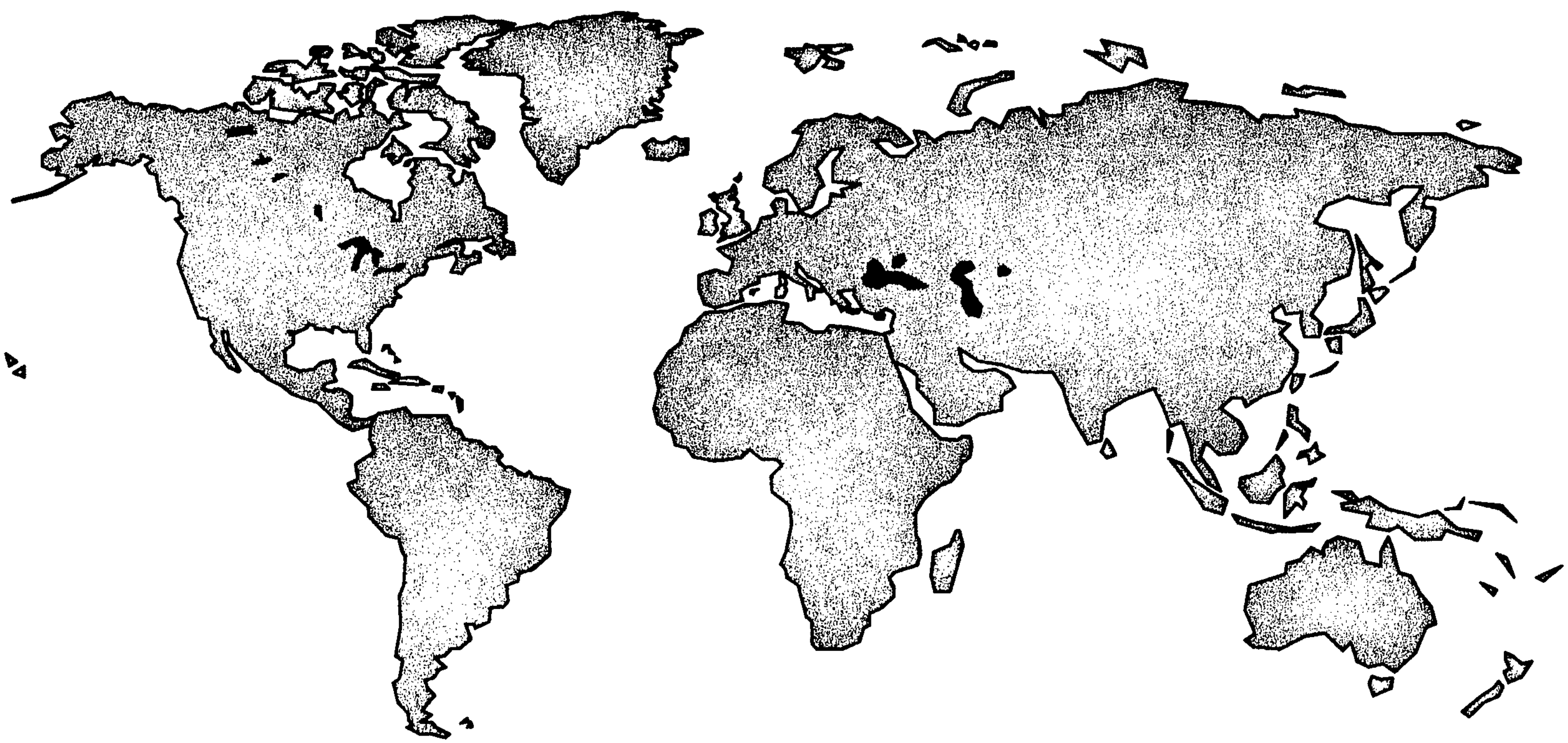
The Asymmetrical Threat, Coalition Operations, and Other National Security Realities - Implications for SOF

Key Featured Speaker: Lieutenant General Patrick M. Hughes, USA
Director, Defense Intelligence Agency (DIA)

GLOBAL OVERVIEW

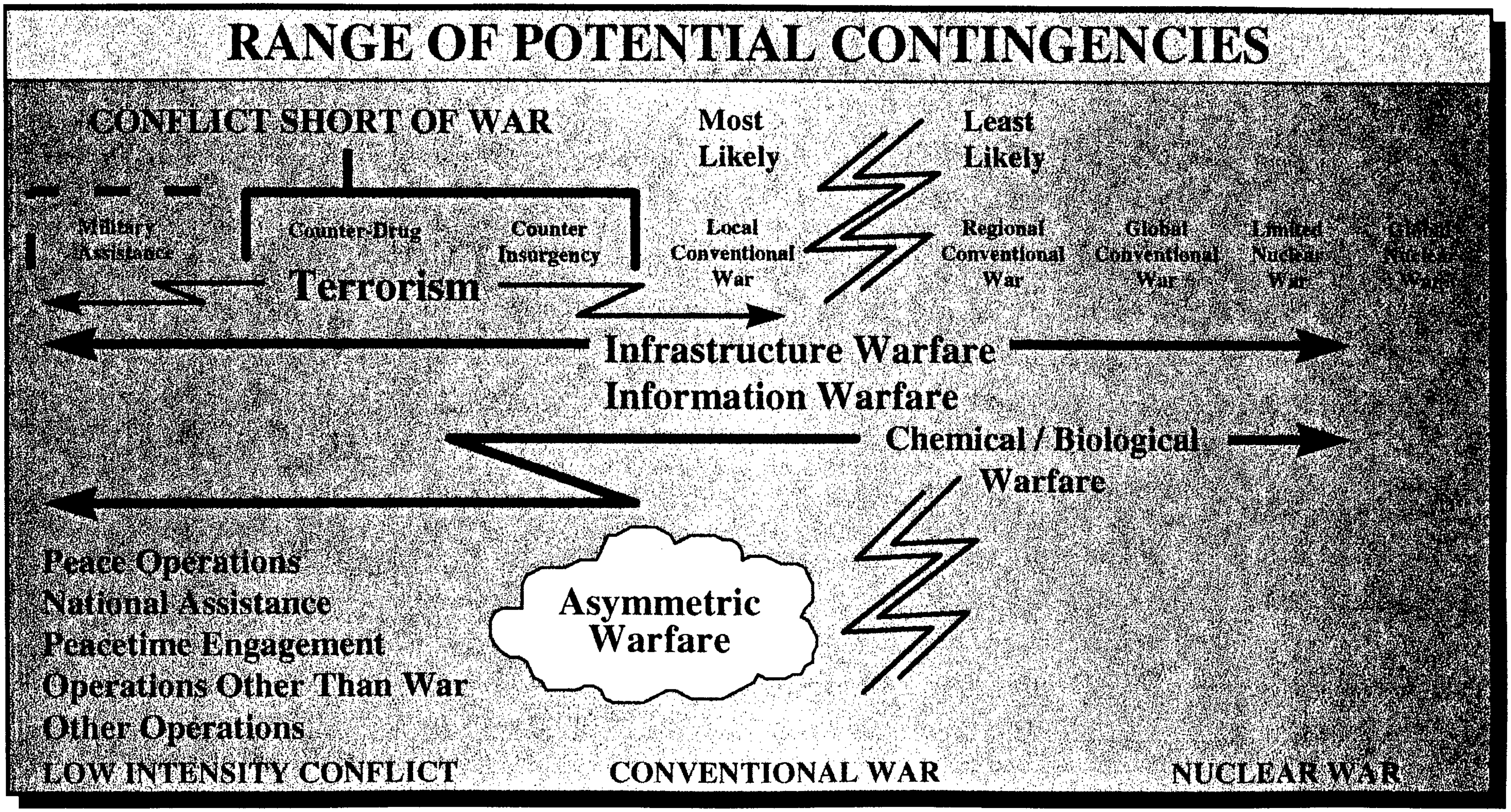
Future Threats and Challenges

The Decades Ahead

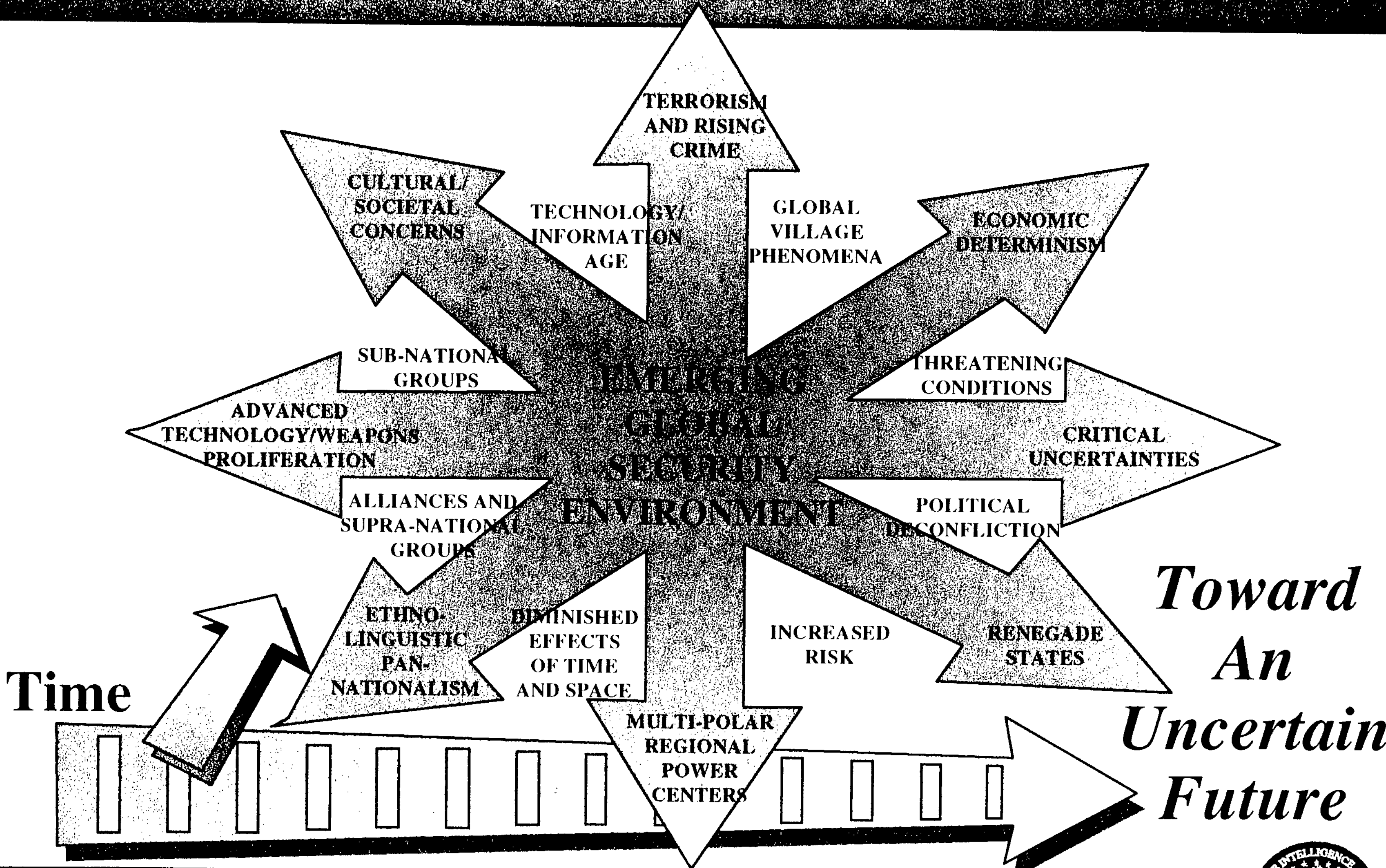


UNCLASSIFIED

Categories of Conflict

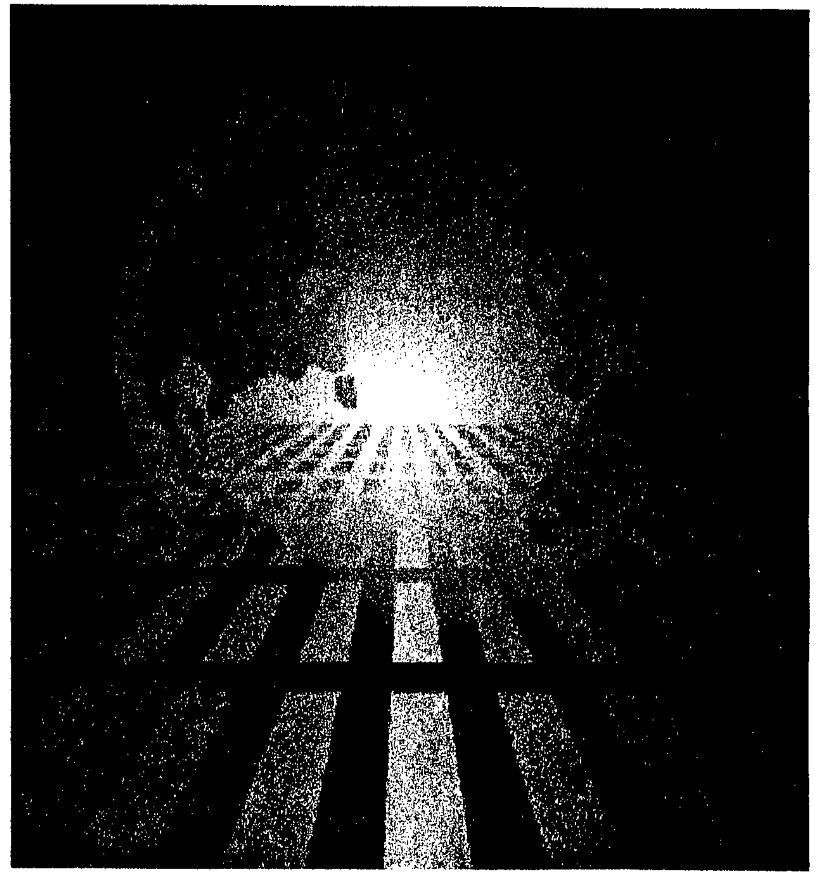


Global Change-An Uncertain Future



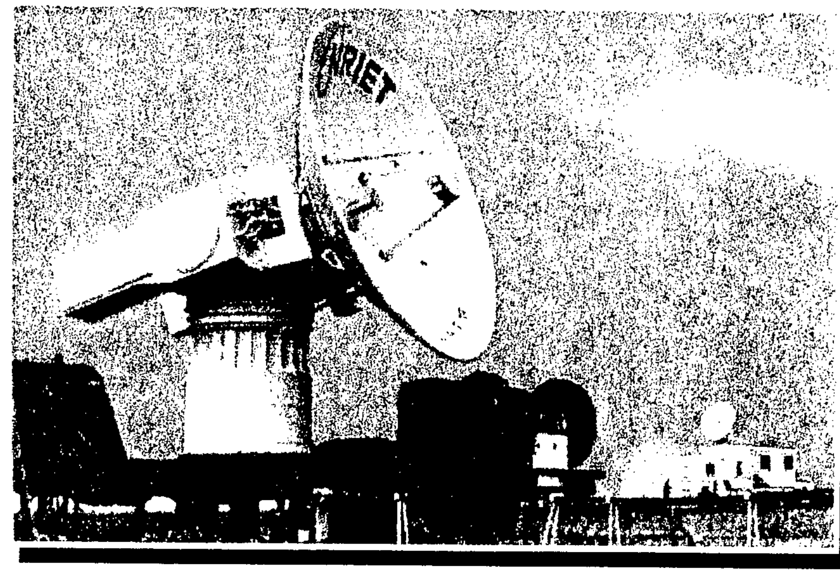
Critical Uncertainties

- Evolution on the Korean Peninsula
- Unimpeded Access to Mid-East Oil
- Middle East Disputes
- Impact of a More Powerful China
- Future of Former Soviet Union
- Evolution of Europe and Eurasia
- Democracy in Caribbean Basin and Latin America
- Africa in Transition



Critical Uncertainties

- Shifts in Regional Power
- Weapons Proliferation
- Viability of Nation States
- Very Advanced Technology
- Asymmetric Warfare
  - Terrorism
  - Bio/Chem War
  - Sub-state Entities



- Wild Card: Large Scale Disasters (Natural/Manmade) with Security Implications

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Plenary Session #1

The Character of Coalition Operations

- Understand How SOF Supports Regional CINCS in Coalition Operations
- Recognize Key Concerns and Issues
- Consider Opportunities and Technology Risks

Moderator: Lieutenant General Joseph Kinzer, USA
Commanding General, US Fifth Army

Panelists:
Brigadier General Norton Schwartz, USAF - Commander, 16th Special Operations Wing
Brigadier General Phillip R. Kensinger, Jr., USA - Deputy Commanding General, USASOC
Brigadier General Thomas Matthews, USAR - Commander, 353rd Civil Affairs Command

SUCCESS IN PEACEKEEPING

UNITED NATIONS MISSION IN HAITI: THE MILITARY PERSPECTIVE

UNMIH

IN THE SERVICE OF PEACE

LTG KINZER

SUCCESS IN PEACEKEEPING
UNITED NATIONS MISSION IN HAITI: THE MILITARY PERSPECTIVE

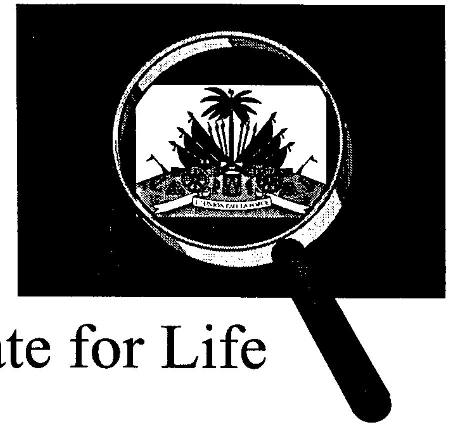
1. <u>BACKGROUND</u>
   - a. Historical perspective
   - b. UNSC Resolution 940

2. <u>MILITARY MISSION</u>
   - a. Mission
   - b. Commander's Intent
   - c. Definition of Success

3. <u>FORCE OPERATIONAL CONCEPT</u>
   - a. Concept of Operations
   - b. Force Deployment
   - c. Conditions for Transition

4. <u>APPLICATION OF PEACE OPERATIONS DOCTRINE</u>
   - a. Definitions of Peace Operations
   - b. Application of the Principles of Peace Operations:
     - Objective
     - Unity of Effort
     - Security
     - Restraint
     - Perseverance
     - Legitimacy

5. <u>CONCLUSIONS</u>
   - a. Doctrine & Teaching on the mark
   - b. Advance Planning Team in Early right people with right skills
   - c. Leaders who are flexible, agile and understand the UN
   - d. Give Deploying Units Time and Resources to Prepare

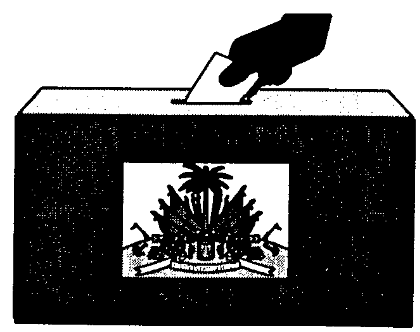


- In 190 Years of Existence, Haiti has had:
  - 21 Constitutions
  - 41 Heads of State
    - 7 Served More Than Ten Years
    - 9 Declared Themselves Heads of State for Life
    - 29 Were Assassinated or Overthrown
- Political and Economic Instability
- Overpopulation
- Extreme Pressure on Limited Resources
- Worst Environmental Degradation in the Hemisphere
- Poorest Nation in the Western Hemisphere

IN THE SERVICE OF PEACE

"...assist the democratic government of Haiti...in connection with:

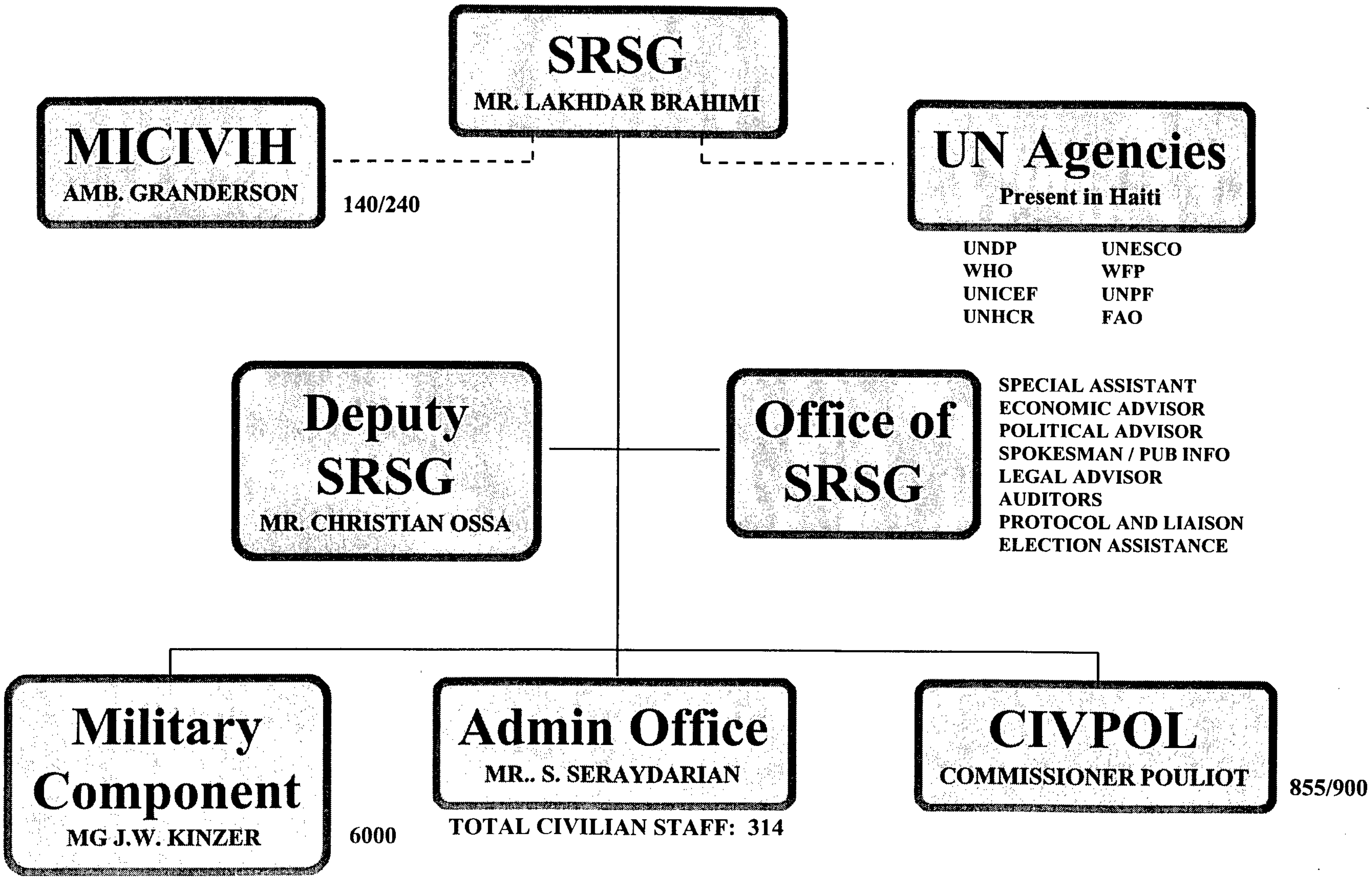
- ☆ sustaining the secure and stable environment,
- ☆ the establishment of an environment conducive to the conduct of free and fair elections,
- ☆ protecting international personnel and key installations,
- ☆ the creation of a Haitian police force."



As per UNSCR Resolution 940 dated 31 July 94

- ☆ the professionalization of the Haitian Armed Forces. (Deleted)

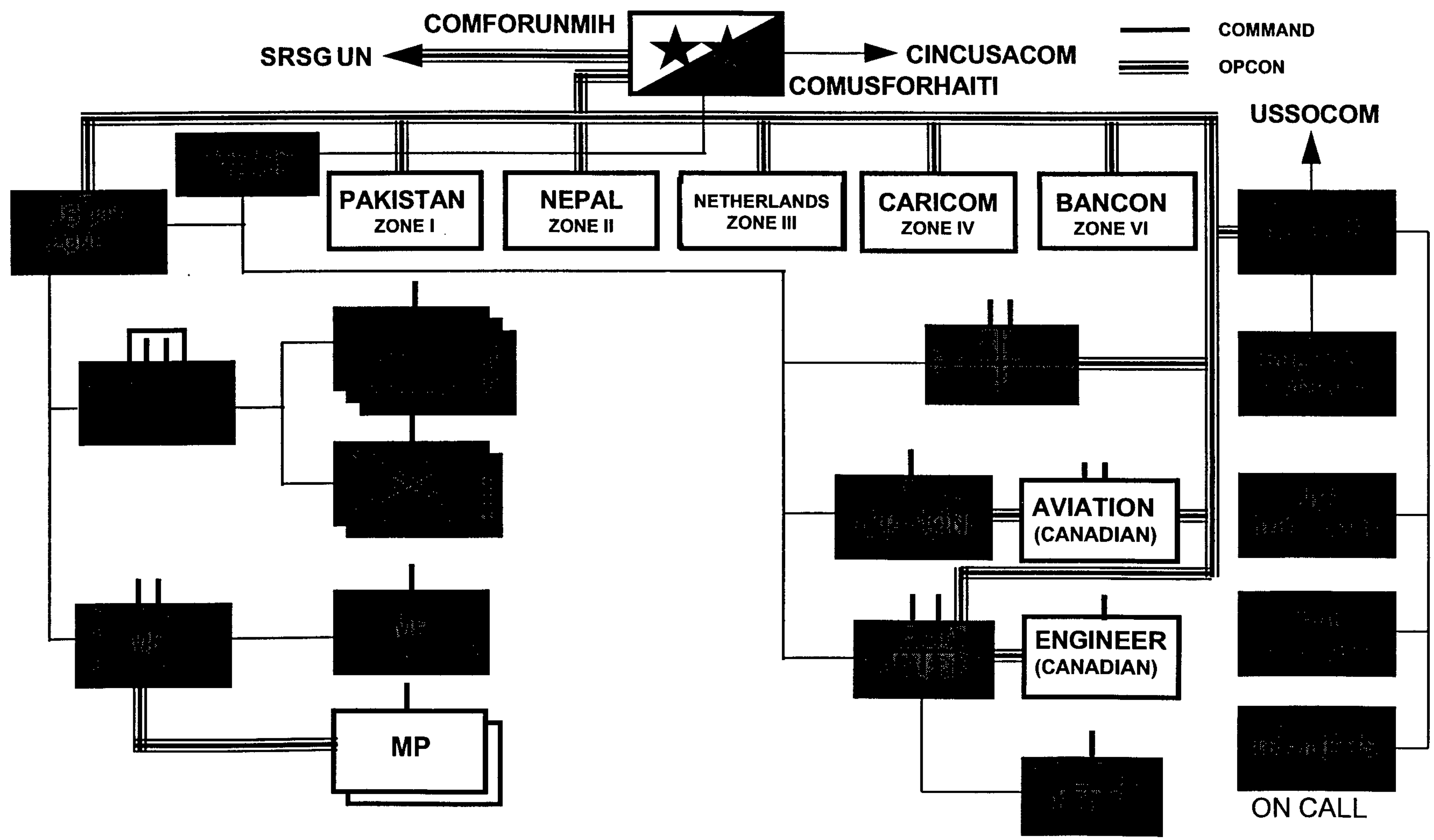
IN THE SERVICE OF PEACE



UNMIH MILITARY ELEMENTS

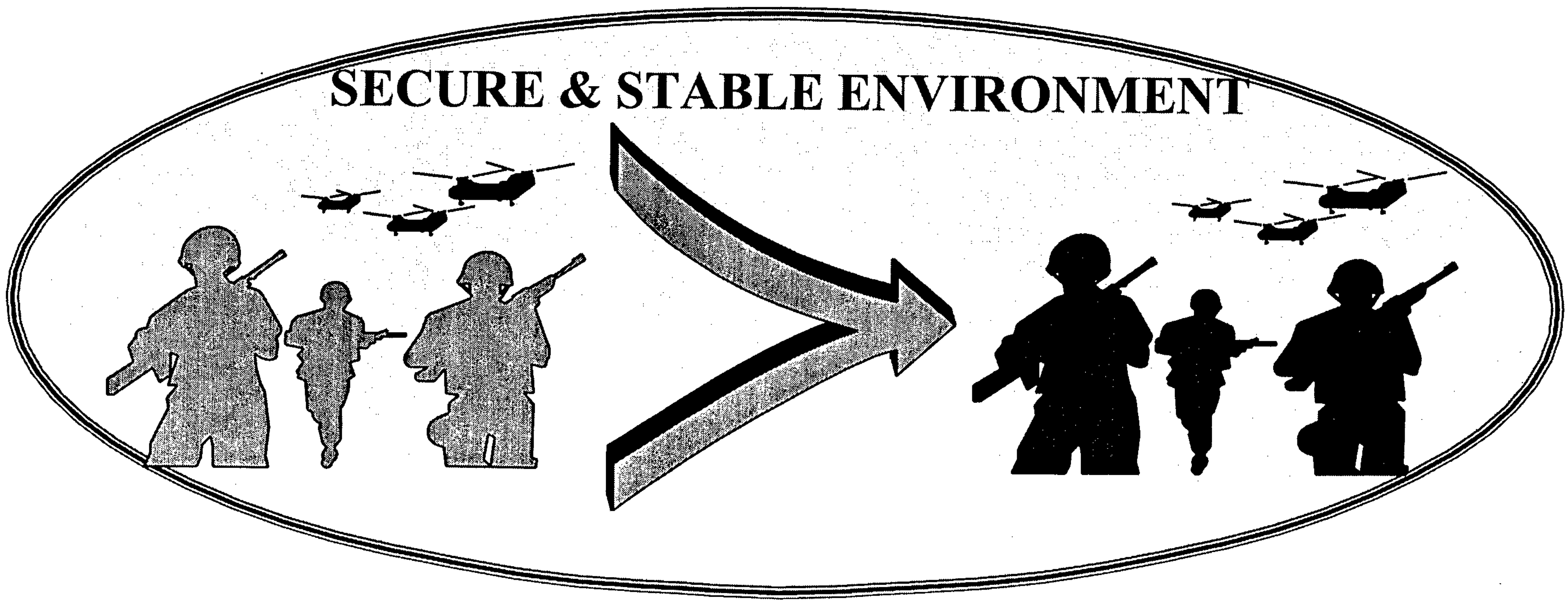
Force HQs	160
Argentina (Arg)	15
Bangladesh (IN)	850
Canada (AV, EN, TRK)	475
CARICOM III (IN)	275
Djibouti (IN)	200
Guatemala (MP)	120
Honduras (IN)	120
India (MP)	120
Nepal (IN)	410
Netherlands (MAR)	150
Pakistan (IN)	850
Surinam (IN)	35
United States	2400
TOTAL:	**6000**

UNMIH FORCE COMMAND RELATIONS



UNMIH FORCE MISSION

The UNMIH Military Component conducts a relief-in-place with the Military Component of the Multinational Force in Haiti from 15 to 31 March 1995, and thereafter conducts stability operations in support of United Nations Security Council Resolution 940.



DEFINITION OF SUCCESS
for UNMIH Force

- A safe and secure environment with a functional and duly elected National Government.
- A professional public security force loyal to the Constitution and the National Leadership.
- A growing economy focused on improving the infrastructure, improving public utilities, and reducing unemployment

COMMANDER'S INTENT

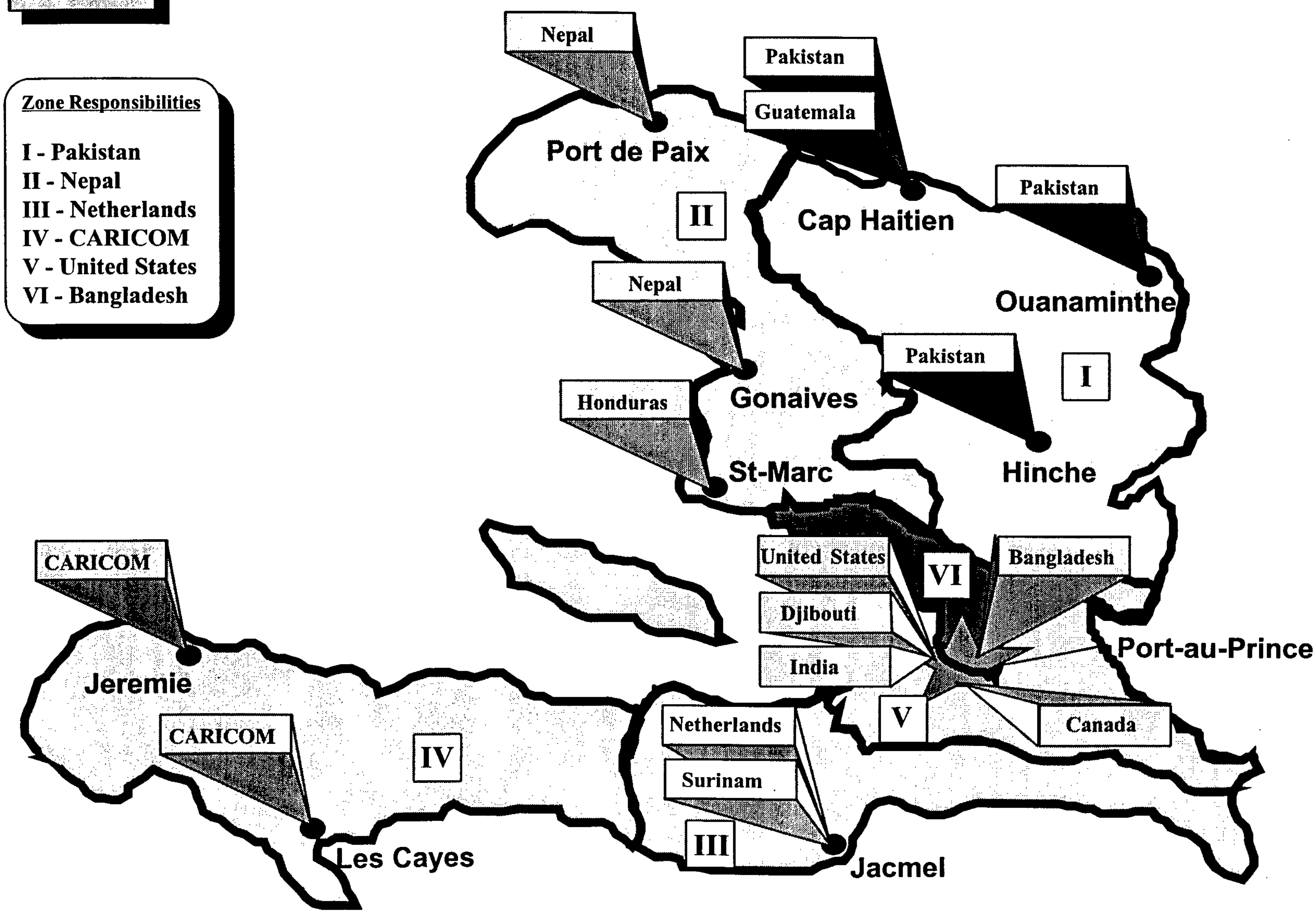
- Purpose: Sustain a secure and stable environment with support of international organizations and agencies in which GOH can achieve and maintain functional governance.
- Method:
  - Expanded presence
  - Active patrolling
  - Close coordination
  - Employ MIST/PIO to their fullest
  - Professional Operations
  - Protect the Force
- Endstate: a secure and stable environment that allows social, economic and institutional development in Haiti, facilitates free and fair elections and a peaceful transition of power and permits safe and orderly redeployment of all UNMIH forces.

IN THE SERVICE OF PEACE

UNMIH

Zone Responsibilities

I - Pakistan
II - Nepal
III - Netherlands
IV - CARICOM
V - United States
VI - Bangladesh



UNMIH

IN THE SERVICE OF PEACE

Maintenance of a Secure & Stable Environment!

- *Continued Presence in Port-au-Prince and Cap Haitien*
- *Expanded Conventional Force Presence in Countryside*
- *Sustained Special Forces Presence Throughout the Countryside*
- *Information Campaign (MIST Operations)*
- *Robust Quick Reaction Force (QRF)*
- *Well Trained & Professional Force - With Punch*

CONDITIONS FOR TRANSITION

from Multi-National Force to UNMIH

- 95% of the military in country
- 85% of staff in place and trained
- QRF in place and rehearsed
- Conventional force relief in place completed in Port-au-Prince and Cap Haitien
- Communications in place and tested
- Logistics system in place and tested
- LOA agreed to by US and UN

DEFINITIONS OF PEACE OPERATIONS

Support to Diplomacy... "conducted to prevent conflict."

Peacekeeping... "designed to monitor and facilitate implementation of an existing truce agreement and support diplomatic efforts..."

Peace Enforcement... "the application of military force or the threat of its use ...to compel compliance with generally accepted resolutions or sanctions."

FM 100-23: Peace Operations (Dec 94)

"Peacekeeping is not a job for soldiers, but only a soldier can do it"
Former UN Secretary-General Dag Hammerkold

APPLYING THE PRINCIPLES (FM 100-23)

* **OBJECTIVE** - Specified in UN mandate and Terms of Reference (TOR).

* **UNITY OF EFFORT** - Task organizing for success; Team Building; "universal" coordination.

* **SECURITY** - Force Protection Paramount.

* **RESTRAINT** - Effectiveness of the ROE in maintaining the secure and stable environment.

* **PERSEVERANCE** - UNMIH Force resolved to fulfill current mandate which ends 29 Feb 96.

* **LEGITIMACY** - MIST campaign crucial to portraying the GOH as legitimate.

OBJECTIVE

- Clear mandate which provides maximum flexibility
- CDR's priorities clearly articulated, reinforced and understood
- Flexible C3 arrangements: personality driven
- Clearly defined ROE not a constraint
- Versatile Force: Light INF, CAV, INF, MP's
- Focused IPB: HUMINT
- LOG intensive: learn the UN LOG system
- Aggressive info campaign: PSYOP and PAO
- Tie CA and Humanitarian Assistance projects to objective
- Mandate key to linkage of major players

"Direct every military operation toward a clearly defined, decisive and obtainable objective." FM 100-23

UNITY OF EFFORT

- Multiple/Complex players: UNNY, Military, US Interagency, GOH, AMEMB, USAID, Other UN Agencies, NGO, PVO, Friends
- Early dissemination of Pol-Mil plan
- Single, identifiable authority for UN,US and Others
- Total linkage at UN: Mil Force, CIVPOL, CAO (and MICIVIH/ other UN agencies in country)
- Personalities Count
- Liaison, Liaison, Liaison
- Cultural Awareness and Work Ethics

"Seek unity of effort in every operation." FM 100-23

SECURITY

- Force protection is a top priority
  - ROE/Graduated response enhances Force Protection
  - ROE is FC developed, UN and Contingent nation approved
- Force Protection Operations Cell
  - Counterintelligence activities
  - Threat/Vulnerability assessments
- Physical security problems encountered:
  - Trash runs as combat operations
  - Sharing the LIC with commercial activities
  - Key: soldier discipline prevents loss of equipment
- Employ DA safety civilians

"Never permit hostile factions to acquire an unexpected advantage." FM 100-23

RESTRAINT

- Understanding threat, IPB
  - Positioning of forces -- deterrence
- Soldier/leader discipline
- Training - repetition, reinforcement
- Created conditions for exercising restraint
  - Non-lethal munitions, PSYOP
- ROE/use of graduated response
  - Commander informs population (incident specific)
- Roadblock/manifestation negotiations
  - Use linguists
  - Use host nation assets

"Apply appropriate military capability prudently." FM 100-23

PERSEVERANCE

- Define strategy to accomplish mandate and maintain mission focus
- Train GOH to take charge
- Overcome difficulties
  - HNP training/stand-up of police force
  - Hand-off of missions (palace, port, PAPIA)
  - "Nay Sayers"
- Role of USSPTGP Haiti: Transition of CA projects
- Force of personality: Force Commander, Power Ranger...

"Prepare for the measured, sustained application of military capability in support of strategic aims." FM 100-23

LEGITIMACY

- FC "Maintain the Moral and Legal High ground"
  - Respect local law
  - Stay within mandate/ROE
  - Communicate Success (information campaign)--Continuous Process
- Soldier training and discipline
  - Remaining ever-vigilant
  - Implications at strategic level
- Treat host nation with dignity, respect & perception awareness
- CA Projects - establish criteria for starting projects

"Sustain the willing acceptance of the people of the right of government to govern or a group or agency to make and carry out decisions." FM 100-23

US-LED UNMIH TO NON-US UNMIH

Challenge: Decision made to extend UNMIH for four months on 29 February, the day UNMIH was to cease operations

Actions:

- Continued planning throughout the deliberations at UNNY
- US, Canada and other contingents leaning forward

Challenge: Haitian perception that US was abandoning Haiti

Actions:

- Active information campaign (MIST/PIO)
- High-profile US Support Group (non-UN) to continue Civil-Military nation building operations

INTRAFORCE TRANSITIONS

Challenge: Transitions had to be seamless, no visible change in presence which increased vulnerability

Actions:
- Conduct a thorough leaders' recon
- Conduct predeployment training on Rules of Engagement, cultural awareness, media awareness, and as mission dictates

Challenge: Unit and staff transitions were a constant

Action: Staffs must have the mental agility to handle this constant change

Challenge: UN expects one troop to fly out as soon as another flies in, allowing no transition time (tied to troop ceiling)

Action: Sounds simple...explain to the UN why we need a transition period

TASKS NOT ORIGINALLY ENVISIONED

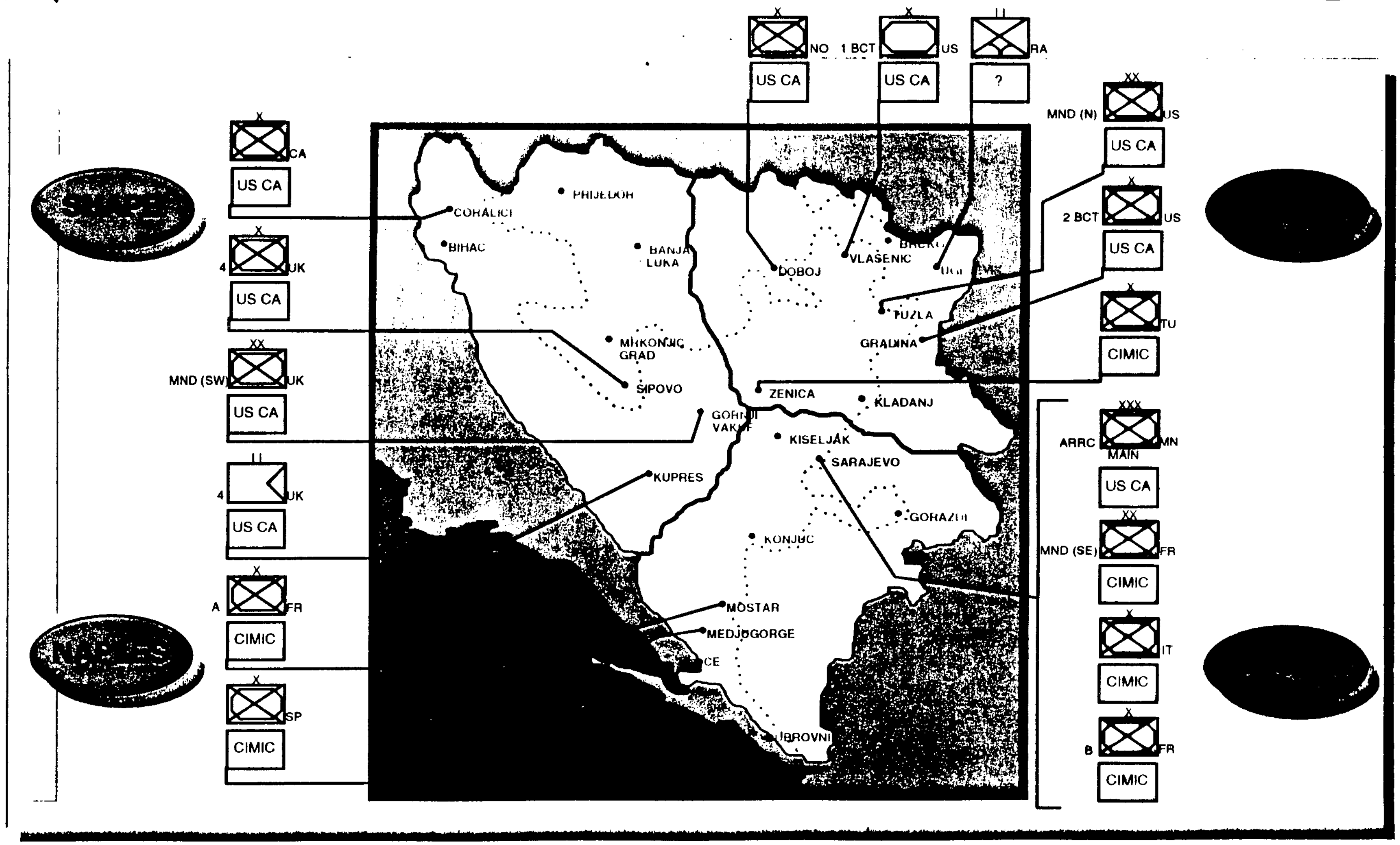
UNMIH

"Mission Creep" or Mission Analysis

CONCLUSION

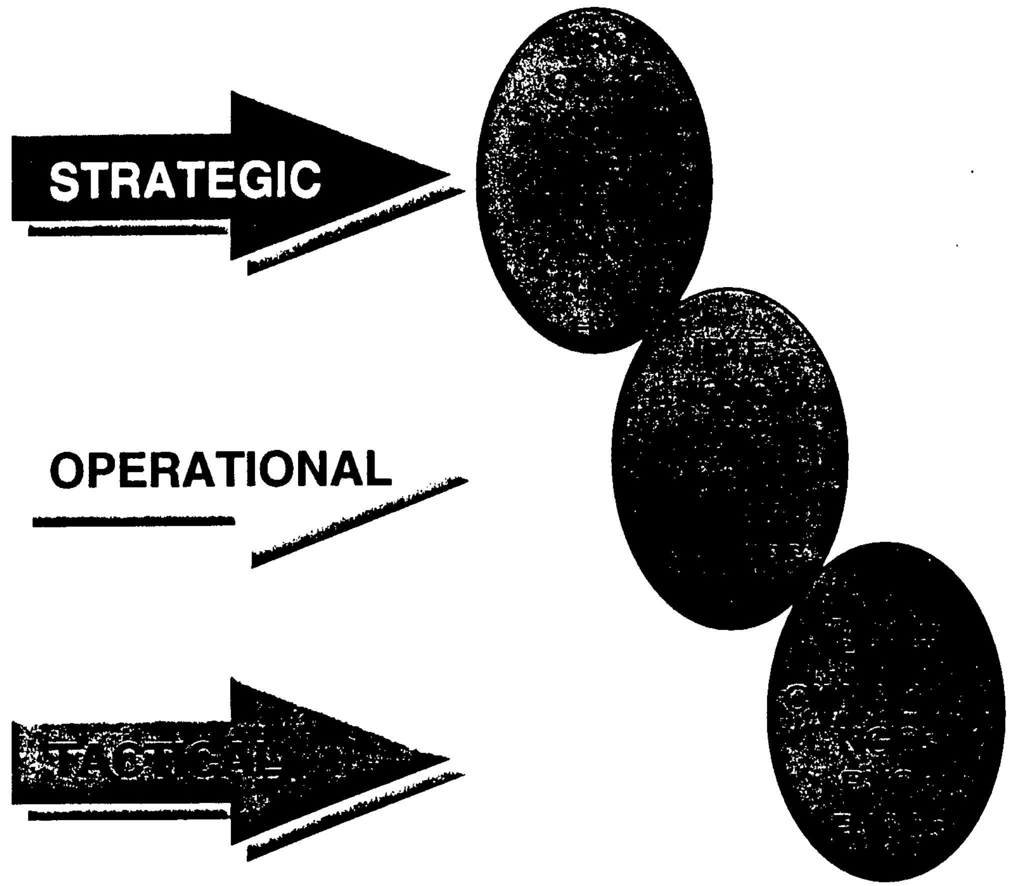
- Peace Operations are tough and complex
- Our doctrine is sound
- School system is on the mark
- Send an advanced team, right people with the right skills
- Develop Leaders who are flexible and mentally agile
- Understand the uniqueness of the UN
- Give deploying units the time and resources to prepare.

CIMIC OPERATIONS



CIMIC OPERATIONS

CREATIVE - ADAPTIVE - INNOVATIVE - ENGAGED - EMPOWERED

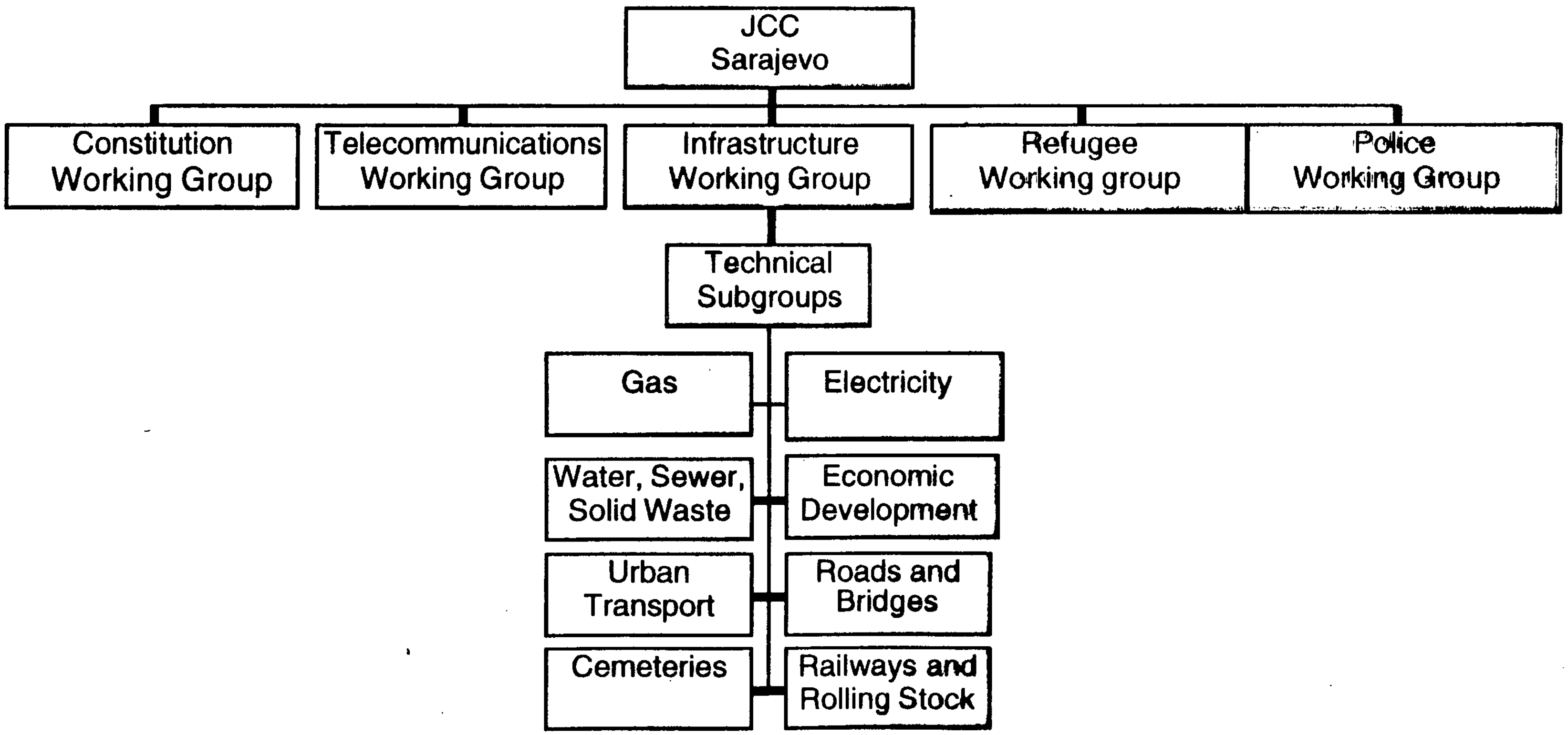


<u>FUNCTIONAL AREAS</u>

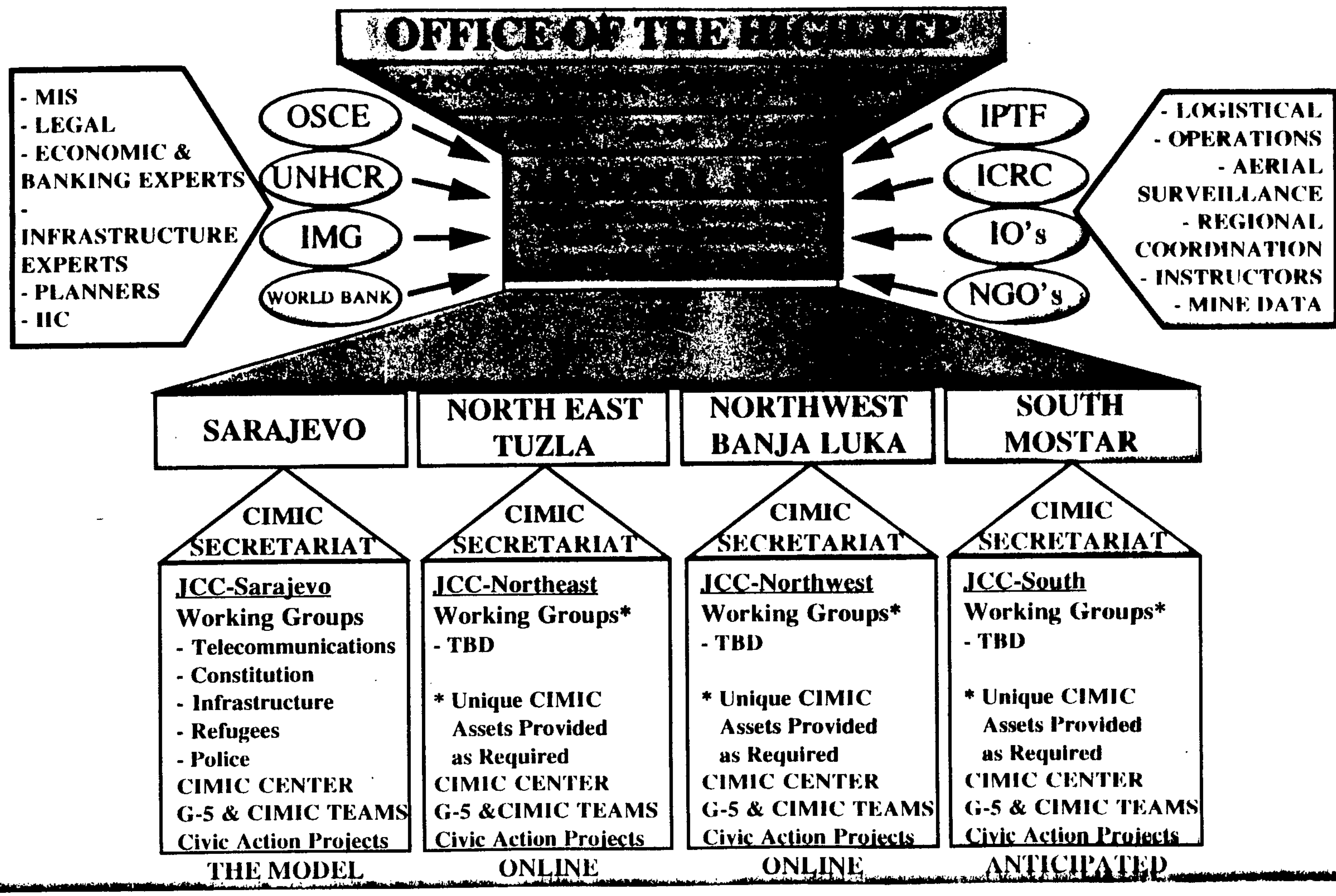
FOM
POLICE
JUDICIAL
MASS TRANSIT
ROADS & BRIDGES
COMMUNICATIONS
UTILITIES
ELECTIONS
GFAP
SCHOOLS
CEMETERIES
DPREs
SARAJEVO TRANSITION
ASSESSMENTS

JCC FOR SARAJEVO

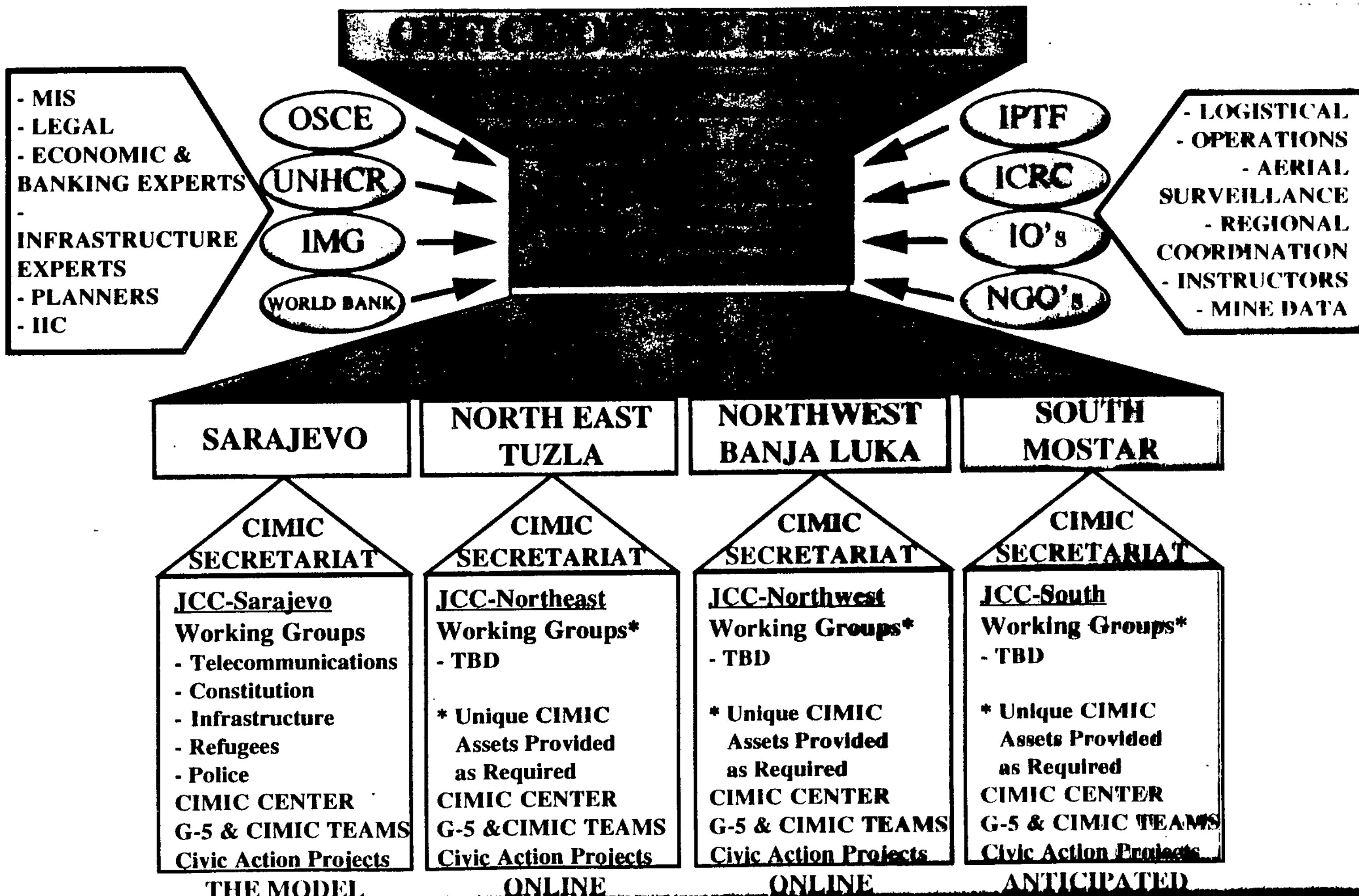
(POTENTIAL MODEL FOR OTHER JCCs)



CIMIC SUPPORT

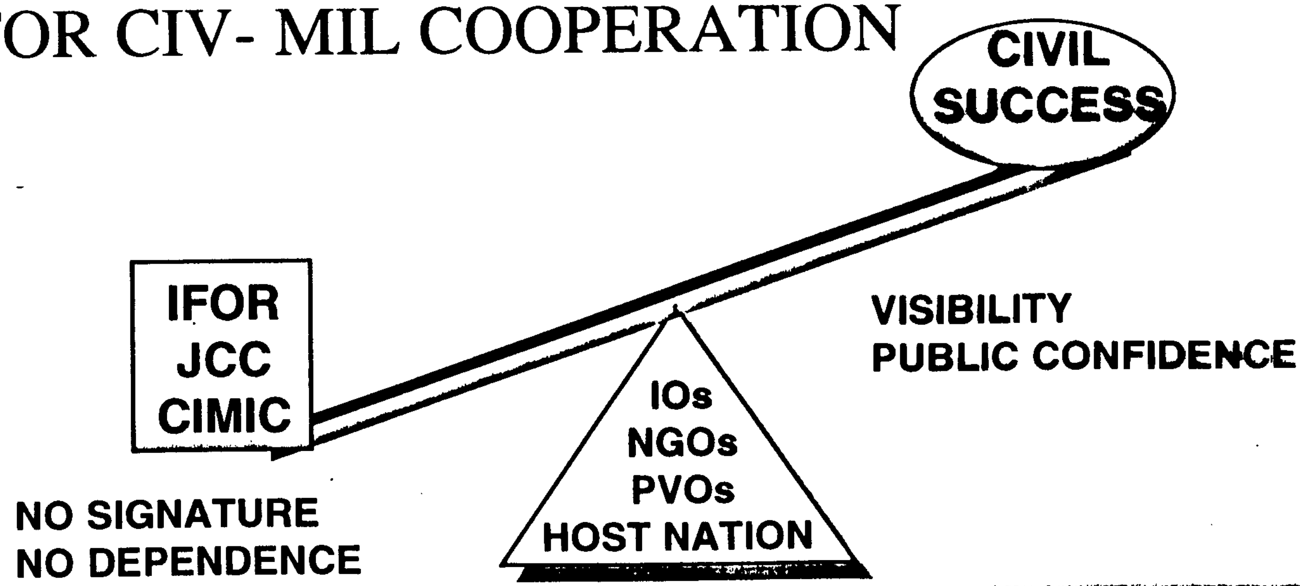


CIMIC SUPPORT



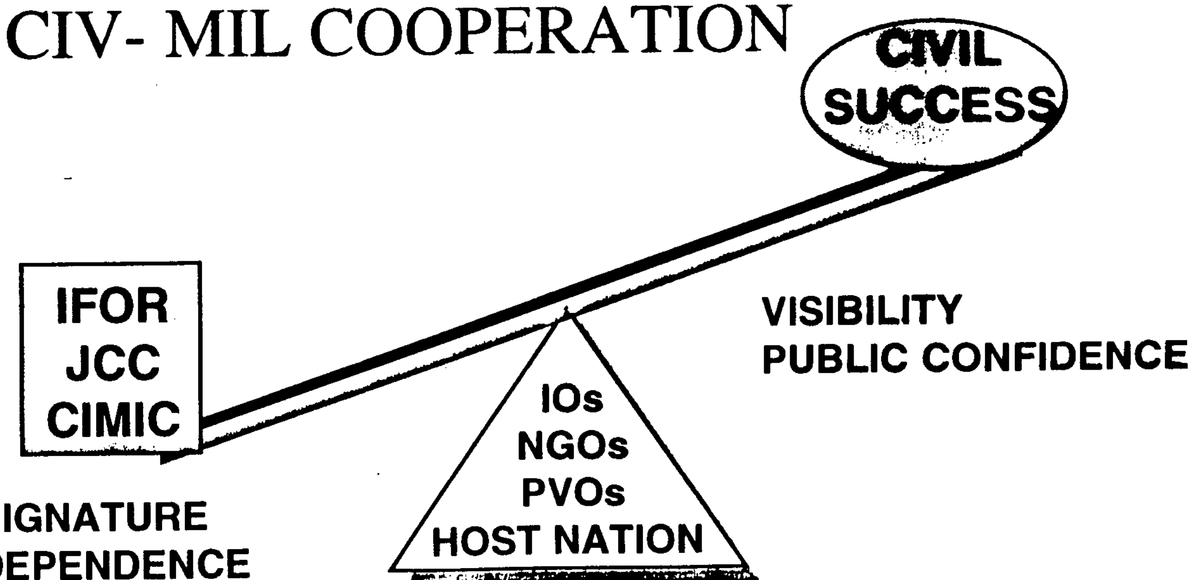
CIMIC OPERATIONS

- TASK
- CONDITIONS
- CIVIL MILITARY COALITION
- IFOR CIV- MIL COOPERATION



CIMIC OPERATIONS

- ❑ TASK
- ❑ CONDITIONS
- ❑ CIVIL MILITARY COALITION
- ❑ IFOR CIV- MIL COOPERATION



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Special Seminars

Panel 1

Maintaining Readiness For Stated SOF Missions - Do Military Operations Other Than War Degrade Capabilities?

Moderator: Colonel George Talbot, USA (Ret.)
Vice-President, Star Food Processing

Featured Speakers:

"The Use of Electronic Performance Support Systems by SOF in the Field"
Mr. Ricardo Gonzalez - Essex Corporation

"Special Operations Forces and Readiness"
Mr. Chris Simmons - Special Operation Council

"Maintaining SOF Readiness"
Lieutenant Commander Barry Dykes, USN,
USSOCOM (SOJ3 - Training)

The Use of an Electronic Performance Support System by Special Operations Forces in the Field

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Humanitarian Demining Project
Night Vision Electronic Sensor Directorate
Ft. Belvoir, Virginia 22060-5608 USA

Beverly D. Briggs
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Abstract— The role of the Army Special Operations Forces (ARSOF) in Humanitarian Demining is to establish demining operations in selected countries that can be sustained by the Host Nation (HN). The Demining Support System (DSS) is an advanced multimedia/presentation technology being used to improve the demining and mine awareness capabilities during Operations Other than War. The DSS is a completely modular, rugged, and shippable unit that provides multimedia and multilingual modules for demining and medical training, access to a database of world land mines and demining equipment operation and maintenance, development of mine awareness materials directly related to the local threat, and templates for mission planning.

INTRODUCTION

The Demining Support System (DSS) is an electronic performance support tool designed to facilitate the deployment and success of Special Operations Forces conducting humanitarian demining missions. The Special Forces Operational Detachment (SFODA) must complete an intensive training mission and support demining and mine awareness activities by establishing a Host Nation (HN) mine clearance training company capable of providing continuous training of HN forces over the long term. Additionally, the SFODA is responsible for supervising the HN cadre in training the operational demining platoons and monitoring the operational platoons in conducting day-to-day operations.

Currently there is a major international thrust to develop demining equipment and techniques capable of augmenting the demining effort. To support this effort, the Night Vision and Electronic Sensors Directorate at Ft. Belvoir has developed over 30 items to assist in the mitigation of the landmine crisis. One of these initiatives is the DSS. The purpose of this paper is to describe the requirements of the SFODA and how the software modules and hardware components of the DSS support those requirements.

REQUIREMENTS

The goal for humanitarian demining missions is to establish demining operations that can be sustained by selected host nations. The objectives for the missions vary according to the Commander-in-Chief (CINC). For instance, the United States European Command had the following objectives:

- to reduce the proliferation and indiscriminate use of landmines,
- to increase mine awareness in the Area of Responsibility (AOR),
- to assist indigenous populations to cope with the landmine problem, and

- to provide knowledge to create and sustain an autonomous host nation demining program.

The United States Pacific Command was interested in creating a program whose responsibilities could be assumed by the Cambodians themselves. The United States Central Command sought to:

- reduce casualties caused by uncontrolled mines,
- return mined areas to productive use,
- create a self-sufficient, indigenous demining infrastructure, and
- put an effective public awareness campaign in place. [1]

The amount of effort needed to make a demining program successful is dependent on the nature of the in-country situation, which varies from nation to nation, and from locale to locale. To assess the situation, a pre-deployment site survey (PDSS) of the country is conducted prior to SFODA deployment. However, the survey is often conducted by someone who is not a member of the SFODA or who is a member of the SFODA, but is not aware of how the information will be used in the planning process. Consequently, the right kind of information may not be gathered.

Based on the pre-deployment assessment, the SFODA determines HN personnel abilities, logistical and maintenance support capabilities, and formulates the training and load plan. Often, when the team arrives in country it discovers that the initial PDSS was inaccurate. In this case, the team must improvise in a nation whose infrastructure is compromised and resources are few. The DSS must support improvisation.

In order for a demining program to be successful, it must meet the requirements of the host nation. However, certain tasks must be completed in order to reduce the HN's landmine problem and restore mined areas to their original peacetime conditions. Minefields must be surveyed, priorities determined, landmines cleared, the public informed, and the operation managed.

For demining, the consequences of inadequate performance are critical. Therefore, the training must be thorough, accurate, and valid. In keeping with the train-the-trainer tradition, it is important that the demining techniques and procedures maintain consistency as they are turned over to the HN trainer.

When the SFODA arrive in country their job is to turn a large group of inexperienced people into a cadre of deminers, trainers, leaders, and decision makers capable of carrying on a successful and long term demining program. The challenge lies in the fact that HN personnel speak a different language, have little or no education, live in a foreign culture with customs different from the SFODA, have few resources, and their country's infrastructure has been weakened by years of strife.

SO/LICs intention was to integrate computer-off-the-shelf technology into a system that would support humanitarian demining operations. In order to meet this requirement an electronic performance support system was designed to:

- minimize the amount of time for pre-mission train-up,
- minimize the amount of time spent in country by SFODA,
- leave behind expertise until it can be achieved by HN personnel, and
- increase the safety of in-country training.

The goal of the DSS is to provide whatever training and information is necessary to generate performance and learning at the moment of need. In the next section is a description of how that was achieved.

DEMINING SUPPORT SYSTEM

To address the flexibility and training consistency needs identified in the requirements analysis phase of system development, an electronic performance support system was designed that is capable of:

- providing information at the moment of need,
- modeling, structuring, and implementing support electronically,
- making the training universally and consistently available on demand anytime, anyplace, regardless of the situation,
- conveying the message in the presentation mode best suited to the target audience, and
- offering an integrated package of previously independent resources. [2]

HARDWARE

The DSS is designed to be shipped to the HN and utilized by the SFODA. The DSS is made up of four ruggedized shipping cases. Two cases, the multimedia case and the monitor case, make up the system workstation. One case contains a poster printer and the other contains a heat press.

The system workstation is assembled by lifting the monitor case on top of the multimedia case and fastening them. When assembled, the workstation is approximately 5.5 feet tall, 25 inches wide, and 27 inches deep. The monitor and dual speakers are

embedded in the top case. The bottom case contains the following components:

- Pentium Laptop Personal Computer
- Mouse
- External Hard Disk Drive
- Portable Color Printer
- Color Scanner
- Color Digital Camera
- Power Conditioner

The poster printer case is approximately 4.5 feet wide, 21 inches high, and 18 inches deep. The heat press case is approximately 30 inches wide, 25 inches high, and 21 inches deep. (See Figure 1. Demining Support System.)

Figure 1. Demining Support System

The DSS operates on 110-120 volts AC, and 50-60 HZ power supply. Where this power supply is not available, appropriate power plug adapters supplied with the system may be used. A reliable power source is not supplied with the DSS.

SOFTWARE

The design of the DSS was derived from data obtained through interviews with mission planners, trainers, medics, and a review of field manuals and after action reports. The utilization of a multimedia platform provides the trainer the ability to give customized and just-in-time training for diverse target audiences and locations.

The demining support program is operated from a touchscreen monitor and contains six program modules. A brief explanation of each module is provided next.

Mission Planning

This module provides access to materials required for the planning and execution of a humanitarian demining mission, including references to after action reports, Explosive Ordnance Disposal schools, and training aids, templates for reports, programs of instruction, and an equipment planning guide.

Demining Training

This module provides lesson plans, video training procedures, training aids, and practical exercise cards for conducting demining training.

Medical

This module has Combat Lifesaver Courses 824 and 825 in English and in Serbian, training aids, go/no go cards, and video training for treating leg and arm, eye, and face injuries sustained by landmine detonation. It also contains current literature on topics related to landmine injuries.

Mine Awareness

This module provides a module for making posters, handouts, cloth transfers, and stickers. It also has a folder of mine awareness materials and a Mine Awareness Program Guide for Cambodia.

MineFacts Database

This module runs MINEFACTS, a database of over 700 landmines.

Electronic Library

This module contains operations and maintenance information on selected demining equipment

SUPPORTABILITY

The concept of the DSS is sound. An instructional systems design methodology was used to develop the content of the modules. The choice of hardware peripherals came from the SFODA's need to:

- edit and print lesson plans and field evaluation cards,
- choose graphics from the MINEFACTS, mine awareness, and training databases,
- design complex training and mine awareness graphics using a paint program, scanner, or digital camera,
- print graphics in poster, handout, sticker, or cloth transfer format,
- play multilingual instructional materials in audio and video modes, and
- operate and maintain complex demining equipment.

The high technological design does not preclude implementing low tech training materials (the common use of posters versus the use of multimedia video training).

The DSS is currently being deployed with the SFODA and a test plan for maintaining the system will need to be implemented.

CONCLUSION

Using a multimedia, electronic performance support system offers the trainer the ability to customize or tailor products and services to meet the needs of the trainee. With adequate and comprehensive training, the integrated package of otherwise independent resources can be left behind and used by HN personnel. Even though the HN personnel are instructed on how to provide training, they will need to develop their expertise. The DSS supplies this expertise while it is being achieved in country.

Currently, the DSS is being deployed with SFODA and the testing phase is not complete. As the system is used and changes are recommended and as new versions of hardware are developed, enhancements to the system can only result in a smaller system, with larger capacity for content and functionality.

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SPECIAL OPERATIONS FORCES AND READINESS

Christopher S. Simmons and Steven P. Adragna

The news media have been replete -- for good reason -- with commentaries on the declining readiness of America's armed forces. While we applaud this belated interest in our military's readiness, we are disturbed by the lack of attention given to the segment of the armed forces that is, by definition, expected to be the most ready: special operations forces (SOF). These forces are structured, trained, and equipped to perform missions ranging from peacetime engagement and humanitarian assistance, through low intensity conflict and unconventional warfare, to dangerous direct action missions in high-intensity warfare. Yet, little attention is being paid to the readiness and capabilities of these forces, despite the fact that they are usually the first called for peacetime, contingency, and wartime missions alike.

The unfortunate reality is that the US Special Operations Command (USSOCOM or SOCOM), the parent command of all special operations forces, does not have the proper mix of active and reserve forces to meet today's challenges. This, in turn, affects the quality and quantity of missions SOF can perform. It needs to be said plainly at the outset: There will always be certain missions that are so specialized or demanding (such as counterterrorism or discrete clandestine operations) that only highly trained active component units can perform them. It bears stating equally plainly that, for many special operations missions, reserve component SOF can do the job as well as their active duty

counterparts. In some instances, RC SOF has skills absent from the active component, such as the civil engineers, financial specialists, and town mayors found in civil affairs units. The key issue here is to insure we treat active and reserve SOF personnel and units as "one team." Reserve and active personnel alike all volunteered to serve in the armed forces. As such, we must be even-handed in permitting--indeed, requiring--both to share in the danger and responsibilities of uniformed service. Military bureaucrats, however, routinely find excuses to continue the under-utilization of reserve component forces. Many reservists are insulted by the excuses, especially the exaggerated statements by well-intentioned but misguided officials regarding RC accessibility and the impact of military deployments on reservists' civilian jobs. Empirical evidence, reinforced by recently enacted legislation to protect reservists who volunteer for or are called to active duty, shows these assertions to be specious and without merit. Reserve component SOF should not be treated as some distant and unwanted relative. Failure to aggressively employ our reserve component SOF assets results in overcommitted active duty units. This, in turn, hurts the readiness, retention, and morale of active duty personnel. Ultimately, excluding RC SOF from mission planning erodes the capabilities, flexibility, and readiness of America's special operations forces as a whole.

<u>Capability</u>. As noted earlier, RC SOF are capable of performing many missions as well as their AC counterparts. To the non-specialist, this many seem counterintuitive. How is it possible

that "part-time" soldiers, sailors and airmen could complete special operations missions as well as "full-time" professionals? The answer lies in the very nature of their work. The emphasis on unconventional missions, highly specialized skills, and small-unit employment means that reserve component SOF often can hone their skills and practice their trade more easily than conventional forces. This is because SOF personnel tend to focus their training on complex individual and small unit skills, whereas conventional forces must focus on basic individual and complex collective skills. This requirement for proficiency in medium and large-unit collective skills degrades the quantity and quality of training that conventional forces can perform.

Several traits differentiate special operations reservists from active duty personnel. Because of their civilian backgrounds, reservists tend to have both higher education levels and a wider variety of degrees than AC soldiers of the same rank. They often have critical civilian-acquired skills in engineering, medicine, communications, government, law enforcement, aviation, finance and procurement, teaching, business, and other fields. Many have prior active-duty service, further enhancing reserve component readiness. Finally, reservists tend to be somewhat older and more accustomed to working with civilians. Collectively, these attributes immeasurably enhance their ability to perform a range of missions across the entire spectrum of conflict. Clearly, the active component forces will always be better able to perform some missions on short notice, especially highly complex missions such

as counterterrorism and direct action behind enemy lines that require training on an almost daily basis. The main SOF missions in the present environment, however, are ideally suited in most cases for cost-effective reserve component units. It should also be borne in mind when contemplating the possibility of a major regional contingency (or two MRCs), that many reserve component forces in general, and almost all RC SOF in particular, can be mobilized quickly.

Accessibility. For years, the reserve forces have been adversely affected by the perception that they are not rapidly and routinely accessible. While there was a kernel of truth behind these perceptions many years ago, accessibility is not an issue for any AC SOF commander who performs a modicum of prior planning.

Rapid access to RC SOF is relatively easy, and history offers many examples of special operations soldiers mobilizing quickly for contingency missions. Here again, the high degree of professionalism, breadth of skills, and small-unit focus of SOF make it possible for reserve component forces to be mobilized, deployed, and employed much more quickly than one would expect for, say, a reserve component infantry or armor brigade. RC SOF are part of the Force Support Package, putting them among the first forces to be used in time of crisis. The accessibility of the two National Guard Special Forces Groups in particular has been enhanced by the Operational Unit Program, which designates Force Support Package units for deployment in a volunteer federal status within seven days of alert. Use of the Presidential Selected

Reserve Call-up, as occurred for Operation UPHOLD DEMOCRACY in Haiti, can further enhance overall SOF readiness, if senior SOF commanders are willing to make use of reserve component servicemen. Reserve forces became even more accessible after Congress' October 1994 extension of the period of active duty for RC mobilization from 90 to 270 days.[1] In addition, alternate methods to insure active Army access to ARNG include Memorandums of Understanding (MOUs) between State Adjutants General and the Army granting immediate access. These MOUs give the Army commander the authority to immediately call-up these select units for rapid deployment.[2]

Deployability. Contrary to official rhetoric and popular lore, U.S. military buildups often take longer than claimed. During the October 1994 Kuwait crisis, President Clinton alerted 35,000 troops in response to Iraqi troop movements near the Kuwaiti border. However, only 4,000 troops actually arrived in Kuwait promptly. Many of those were not ready nearly two weeks after they were alerted, well behind predictions. Former Assistant Secretary of Defense Lawrence Korb observed that deployments do not "happen as quickly (as expected) for a combination of reasons -- usually politics and logistics." In December 1995, President Clinton ordered 20,000 troops deployed to Bosnia. Two weeks later, only 800 paratroopers had arrived in country. Bad weather, problems with rail transportation, and other issues prevented the entire force from arriving until almost two months after the deployment began.[3]

Under ideal conditions, U.S. military forces can deploy quickly, but circumstances are rarely ideal. In addition, instances of major short-notice deployments are rare. Of the 35 major deployments of U.S. forces since 1950, only a few operations, such as JUST CAUSE and URGENT FURY, were executed so quickly that reserve forces did not participate. Contrary to popular belief, the reserve components participated extensively in many of these 35 deployments, and in several instances, were the first forces deployed.[4]

Cost-Effectiveness. Perhaps the ultimate argument in favor of robust RC SOF during this era of constrained resources is that they offer so much capability and flexibility to national decisionmakers for only about a third of the cost of maintaining a comparable AC unit. Clearly, cost should not be the sole or even primary determining factor. But, if RC SOF can reliably accomplish a broad range of missions that are central to our nation strategy, and do so for a fraction of the cost of AC units, doesn't it make sense to make more extensive use of them?

If we truly want to preserve our readiness for any contingency, we should take a closer look at strengthening, and even rebuilding, our reserve component special operations forces. Cosmetic changes are inadequate. As numerous "low intensity" conflicts have already demonstrated, there is often a high price to be paid in human lives and national credibility when force structure enhancements are too little, or come too late.

Technology. There is a breed of reformer who feels that all of America's military problems can be whisked away by new technology. Equipment will be overhauled to become more efficient and effective. Digital technology will speed actions, reduce paperwork, and so forth. The power of technology will transform the military into a well-oiled warfighting/peacemaking machine requiring far fewer troops. Power projection and national military strategy will be carried out primarily through the use of surgical strikes by technologically advanced ground, air, and sea forces. Technology will allow this small, highly mobile military force to perform many operations from afar, minimizing U.S. involvement and commitment. However, as Army Vision 2010 so aptly noted, "Reality proved this theory invalid."[5]

The 43-day air campaign during DESERT STORM was the largest use of U.S. air power since the Vietnam War. The intensity of the air campaign is evidenced in that the U.S. bomb tonnage dropped per day equaled 85% of that dropped on Germany and Japan during World War II. The air war was a critical component in the success of DESERT STORM. However, the GAO's study of the air campaign revealed that infrared, electro-optical, and laser systems were all seriously affected by clouds, rain, fog, smoke, and high humidity. Pilots reported that they were sometimes unable to identify whether a tentative target was a tank, truck, or already destroyed. Meanwhile, the Pentagon and defense contractors overstated and made misleading claims about the weapons used during the Gulf War, to include the F-117 stealth fighter, the Tomahawk cruise missile, and

precision guided munitions. Based on these findings, the GAO has questioned the military's increased reliance on precision guided munitions, given their extremely limited effectiveness during DESERT STORM.[6] This is proof that, despite major advances in weaponry, all the deficiencies have not been worked out. Robert W. Gaskin, a former Pentagon planner said, "For all of the hype, the improvements we've seen in military capability so far have been incremental. The so-called 'revolution' that the services have been touting is coming slowly"[7]

The Pentagon, defense contractors, and reformers have also failed to grasp the impact of OOTW on high-technology systems. In January 1995, GEN Wayne A. Downing, then the SOCOM commander, noted "One of the great challenges to our nation, and in particular to the SOF community, is to adapt our high-tech forces to fight in that low-tech part of the world...that almost certainly don't have the kinds of infrastructure for which our precision weapons are so ideally suited." GEN Downing also noted that "...while high-tech is important, there are challenges for which there are no high-tech solutions. In some parts of the world...high-tech will be of no avail, because the roots of the problems are in the minds and hearts of men. It is here that our investment in people will be important.[8]

National Strategy. In his 8 March 1994 Congressional testimony, the Army Vice Chief of Staff, General Peay, averred that the Army must be "designed to conduct the full range of operations -- from humanitarian assistance through high intensity war, against

the full range of potential adversaries, in any climate or terrain, and under a variety of alliance conditions."[9] In fact, with the current emphasis on regional conflicts and coalition peace operations, SOF capabilities are even more relevant in today's global security environment than they were in the past. The theater commanders' needs for SOF during peacetime have grown so considerably that fully half of USSOCOM's force structure is intended to meet wartime requirements and half to provide a peacetime U.S. forward presence around the world.[10]

Military operations from the late 1980s through present day have proven that SOF are invaluable as facilitators and peacetime operators, as well as combatant forces. The extraordinary growth in SOF OPTEMPO is irrefutable evidence of the value-added that SOF provides. This increase recently prompted MG Kenneth Bowra, the Commanding General of the U.S. Army Special Forces Command, to note, "The demand for Special Forces has increased considerably since the end of the Cold War."[11] Of course, everyone is now familiar with GEN Norman Schwarzkopf's contention that SOF were the glue that held the coalition forces together.

Because of their flexible nature, SOF need fewer modifications (such as specialized training) than most conventional forces, which have been trained primarily for conventional missions. This is especially true for OOTW. Reserve component SOF are critical to these missions, as they are an effective and efficient resource at an increasingly attractive low cost. GEN Downing observed that "many of the problems in the developing world today require the

unique skills and talents found only in Psychological and Civil Affairs units.[12] Fully 97% of Army Civil Affairs and 70% of all Psychological Operations are found in the reserve component.[13] Defense Secretary William Perry's 1995 <u>Annual Report to the President and the Congress</u> noted of RC SOF "Their specialized skills, as well as regional expertise, have identified them as valuable participants in operations which require sensitivity to local and foreign customs and economy-of-force efforts."[14]

Special operations forces perform important and unique functions. Because of the versatility of special operations forces, they are distinctly capable of making contributions in a sustained way across the broadest array of national requirements. In <u>Army Vision 2010</u>, the Army heralds its role in supporting a preventive defense. Through peacetime engagement, it is an active and dominant player in preventive activities ranging from nation building to military-to-military contacts. The Army claims that through the presence of land forces, it provides a unique capability to impart American/democratic values as it interacts with foreign armies and people. In doing so, it will favorably shape the world environment and keep potential dangers from becoming full-blown threats.[15]

It appears the Army is trying to assume a "new" mission that, in fact, is being carried out by USSOCOM. In the 1986 Defense Authorization Act, Congress designated SOF as "the military mainstay of the United States for the purpose of nation-building and training friendly foreign forces in order to preclude

deployment or combat involving the conventional or strategic forces of the United States."[16]

SOF, more so than the Army, Navy, or Air Force singly, is the force of choice for theater commanders. This is especially true in today's complex national security environment where military operations are characterized by significant civil-military considerations and requirements for civilian interface.[17] From 1950-1989, American military forces conducted 10 notable deployments. Since 1990, there has been 25 deployments; sixteen times the rate of the previous four decades. This new paradigm reflects America's strategy of global engagement.[18]

<u>Evidence of Success</u>. In Bosnia, RC SOF have carried out the brunt of the Civil Affairs mission and provided much of the PSYOP support.[19] During Operation UPHOLD DEMOCRACY, as much as two-thirds of the Special Forces personnel in Haiti were National Guard.[20] At one point during Operation PROVIDE COMFORT, fully 50% of all deployed Special Forces detachments were reserve component.[21] Psychological operations during Desert Shield/Desert Storm resulted in the surrender of 50,000 to 80,000 enemy soldiers. Contributing to this victory were the sixteen reserve units from the U.S. Army Civil Affairs and Psychological Operations Command that participated in the conflict.[22]

<u>Cost of Failure</u>. Morale, a key determinant in the effectiveness of all organizations, is being undermined by the high OPTEMPO of SOF. MG Bowra recently told <u>Armed Forces Journal International</u>, "It is becoming increasingly difficult to limit

soldiers to an OPTEMPO that does not harm training, morale, or family life. The yardstick we use is 179 days deployed..." MG Bowra added, "We do rely on the 19th and 20th National Guard [Special Forces] Groups to conduct as many of these missions as possible, both for their own training and to relieve the OPTEMPO stress on the active units."[23] In April 1996, the General Accounting Office (GAO) reported that the high rate of U.S. military deployments is taxing Special Forces and other in-demand units and harming their readiness. The GAO predicted that this trend will continue until the senior leadership exercises better personnel management over these forces.[24]

Foreign Examples. The U.S. is not the only country with SOF in its reserve component structure. The U.K., Germany, Australia, and others, all have assigned special operations units to their RC forces. Foremost among these reserve SOF are England's 21 and 23 Regiments of the Special Air Service (SAS). Only one regiment (22 SAS), is regular Army and, unlike the sometimes strained relationship between active and reserve SOF in the U.S., the SAS's regular and territorial regiments maintain a close relationship.[25]

Recommendations. The reality for America and USSOCOM, as proven by a 1993 Congressional Research Service study, is that there are "too few SOF for too many tasks."[26] This was true in 1993, and the problem has been exacerbated by additional demands since then. We need only look at the explosive growth in SOF deployments, over 300% from FY91 to FY93 alone followed by increases of 21% in FY94 and 23% in FY95. These increases,

compounded upon the phenomenal growth already cited, has resulted in a SOF OPTEMPO 446% higher than 1990.[27] RC SOF are ideally suited for many of these missions, especially in the fields of Civil Affairs, Psychological Operations, Special Forces, and special operations aviation.

MG Bowra recently stated "National Guard soldiers are just as professional and eager to deploy as active-duty soldiers. The main problem comes down to money, specifically limited funds for National Guard pay and allowances, which would allow them to deploy for periods longer than their 14-day annual training time."[29] Since 1987, AC SOF personnel strengths have continued to climb, as have inventories of costly weapons and support systems.[30] This growth has been subsidized, in part, by years of RC SOF downsizing. USSOCOM is now paying for this penny-wise, pound-foolish strategy in the form of dramatically reduced retention rates and lower morale in active component ranks due to the stressful OPTEMPO.

Force reductions are not (or rather should not) be an equal opportunity employer. Less relevant military forces from within the conventional force structure should be eliminated to provide resources for the growth of USSOCOM reserve component units.
It is foolhardy to believe that USSOCOM can maintain its current OPTEMPO (let alone increase it) without an increase in its manpower. We suggest the command implement these changes to negate the crippling effect of this overwhelming OPTEMPO. Manpower levels for AC SOF manpower should be frozen at current levels, rather than allowing the AC force structure to become hollow. Procurement of

expensive, "big-ticket" systems should be drawn out over additional years, unless they satisfy a compelling and immediate need. Finally, and most importantly, USSOCOM should be provided with two additional reserve component Special Forces Groups, one rotary-wing Special Operations Aviation (SOA) battalion, and some small increases in fixed-wing SOA and psychological operations. These new RC assets -- and the existing reserve forces -- must be totally integrated with their AC counterparts. Funding for RC SOF should also be increased sufficiently to permit these units to conduct 29 days of annual training, in addition to the regular "weekend" drills.

We need to break the current mindset that divides AC and RC SOF into separate camps. In the emerging international security environment, the U.S. will need robust and responsive SOF more than ever. It is imperative that our SOF operate as one team. We must take concrete steps now to ensure that our team is trained, equipped, and ready for the 21st century.

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MAINTAINING SOF READINESS

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INTRODUCTION

Retaining special operations forces (SOF) in a high state of readiness is crucial to maintaining the ability of the United States to rapidly, forcefully and successfully respond to the myriad of volatile areas around the globe today. Critical to ensuring SOF readiness is a proper training and exercise program that covers the entire spectrum of SOF primary and collateral missions. However, not only must the soldiers maintain their fighting edge, war-fighting Commanders in Chief (CINCs) must know how best to employ these assets. The training that ensures readiness is a three tier system that includes major exercises, Service and unit level training, and actual operations that provide training in the field.

MAJOR EXERCISES

Major exercises, both joint and combined, were created and designed to provide realistic training that allows the warfighting CINC to make an unqualified assessment of his Component command's ability to wage war. This assessment is critical in adapting new strategies and reworking operational plans that provide the highest probability of success when faced with a real crisis.

So where do SOF fit into these exercises? Exercises should be as realistic as possible and reflect how forces would be utilized in a real action. SOF should be typecast into exercise play, fulfilling the same role that they fulfill in preparation for armed conflict. They should conduct the same missions that they would be called upon to conduct in a real operation, and contribute to an exercise the same capabilities that they would provide during an armed conflict or in operations other than war (OOTW) that involve military participation.

Most exercise scenarios routinely involve SOF, but are traditionally committed to performing missions that support conventional forces, such as Strategic Reconnaissance (SR), Direct Action (DA) and Combat Search and Rescue (CSAR). These principle missions and collateral activities are important and need to be exercised. While they may not challenge the full range of the capabilities that SOF offer, they do allow the CINC to partially appreciate the use of SOF when war is inevitable.

Major exercises normally focus on fighting and defeating enemy forces in a short time frame. However, SOF conduct long term operations before, during, and after conflict. The only way for these major exercises to fully evaluate the entire spectrum of SOF missions would be to develop an exercise scenario that ran the full profile of war from the build-up of forces through re-deployment. With exercises routinely lasting only about two weeks, time does not allow for the full development of a scenario that would include other principal SOF missions, such as foreign internal defense (FID), civil affairs (CA), psychological operations (PSYOP), unconventional warfare (UW) and information warfare (IW).

Additionally, in this age of austere funding, the budget simply will not support the lengthening of existing exercise schedules. With training funding stretched to its limits and airlift requirements that already exceed availability, these exercises must necessarily concentrate on exercising conventional forces and testing their ability to fight a war. Pre and post conflict activities are treated as given conditions and artificially replicated.

OPERATIONAL LIMITATIONS

Most important, however, are the operational issues to consider. Despite the ongoing force reduction, SOF requirements have increased. Simply stated, we have fewer people to do more work. Even if the funding existed to conduct lengthy, all encompassing exercises, real world commitments preclude increased participation by SOF Component commands and personnel. Operational tempo remains a major concern when scheduling training exercises of any size and duration.

The issue, then, becomes whether or not an increased readiness posture is sacrificed by not playing a bigger role in joint and combined exercises. Some major contributions from SOF that are not routinely exercised during major exercises, include FID, UW, IW, PSYOP, and CA. These missions most commonly involve shaping the battlefield during the pre-hostilities phase and rebuilding during the re-deployment phase of war. However, during a major joint or combined exercise, the war-fighting CINC is concerned with assessing the ability of the Component commanders to carry the battle to the enemy. Taking that as the focal point, the major exercises may not be the best method of providing the required SOF training. What is needed are SOF- specific exercises and Service and unit level training that are both continuous and ongoing.

OPERATIONS OTHER THAN WAR

SOF are required to be ready to operate in the full spectrum from peace to war. Beyond major exercises primarily designed to train conventional forces, SOF needs training in its unique peacetime engagement and conflict deterrence and prevention capabilities. Counterterrorism and counterproliferation missions require frequent and detailed exercises to sustain a high level of readiness. Operations Other Than War also call for extensive work with foreign forces resident in SOF FID, CA, and PSYOP missions.

The Joint/Combined Exchange Training (JCET) Program is an excellent venue to maintain readiness. The JCETs allow direct, hands-on experience in a variety of SOF primary and collateral missions. Under this program, originated by USCINCSOC, SOF conduct a significant portion of the training that is required, but that is not routinely evaluated during a major joint or combined exercise. JCET training is always conducted outside the continental United States and involves training with foreign forces in their country. However, the training always supports the mission essential task list or joint mission essential task list (METL/ JMETL) for U.S. SOF. More important, the METLs and JMETLs are prioritized and coordinated through the theater Special Operations Commander, ensuring that the training that a particular command needs is received.

These JCETS have been a huge success, providing training opportunities that are capable of testing METLs and JMETLs across the entire spectrum of SOF primary and collateral missions. In fiscal year 1996, there were 232 JCET training exercises in 79 countries, involving all five theaters. There are a similar number of JCET events scheduled for fiscal year 1997.

A number of real world events also plays a part in maintaining readiness for Special Operations Forces. Many of the missions that SOF carry out, especially in operations other than war (OOTW), are practiced during real world missions. For instance, there are SOF units presently involved in OOTW in Bosnia-Herzegovina, Brazil and Haiti. An average week in FY 96 saw SOF in 60 countries. Their mission is real, and the hands-on training and area orientation that they are receiving simply could not be duplicated in an exercise scenario.

Conversely, one possible way of improving training opportunities, while maintaining operational tempo, would be to look closely into some of the OOTW tasks to which Special Operations Forces are committed. OOTW is not the exclusive field of SOF. Conventional forces perform the majority of OOTW missions, often with SOF support such as in Bosnia. In addition, other USG agencies, international organizations, nongovernment organizations, and multinational forces are actively involved in OOTW activities. SOF availability is limited, and careful planning is required to obtain maximum leverage from scarce assets. Coordinating operations with other US and non-US forces can avoid duplication, enhance efficiency, and allow SOF to sustain readiness for all regional CINC requirements.

CONCLUSION

In summary, the training provided to insure that SOF are ready to perform their missions is on the right track. While there is always room for improvement and refinement, the variety of exercise and training opportunities covers the wide range of missions that SOF perform. The combination of major joint and combined exercises and JCETS, along with careful selection of METLs and JMETLs ensure that all facets of required training, including OOTW, are evaluated and that SOF are ready to answer the call.

Panel #1 SOF Readiness
There are 3 Principle Topics

1. Capabilities/use of Reserve Component (RC) to Support SOF Requirements - Case made that RC not fully employed - not fully equipped to perform missions. Case made that some SOF RC elements can do some SOF missions (Humanitarian Support) better than AC because of civilian skills while AC can do other mission (DA-SR) better.
Conclusion: Better use of RC in SOF Mission would enhance RC morale (commitment) while relieving/lowering the AC deployment Operational Tempo - Recommendation: Review means to better use and employ RC to accomplish certain missions. Consider fostering legislation to ensure "Job Security" for RC personnel.

2. Does SOF Commitment to Military operations other than war (MOOTW) degrade SOF readiness Presenter made case that MOOWT such as SOCOM Joint/Combined Exchange Training (JCET) do not degrade SOF readiness but in-fact enhance SOF readiness by expanding HN relations with potential foreign allies and builds knowledge of Host Nation (HN) personnel of terrain, culture, and infrastructure. Warning was voiced that over-commitment on SOF personnel (extended/numerous) in back-to-back deployments could have negative impact on soldier's families.
RECOMMENDATION: Quadrennial Defense Review (QDR) - ADPA resolution that QDR examine / enhance SOF Force Structure to bring it in line w/ force posture of 1990.

3. De-mining "training" system. Mine database should be "bi-lingual - voice and print used to train the HN de-mining cadre.

American Defense
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Special Seminars

Panel 2

Future SOF Mobility Requirements - What Will Drive the Requirements?

Moderator: Colonel Tim Davidson, USAF (Ret.)
Davidson Consulting

Featured Speakers:

"The Impact of the CV-22 on Future SOF Mobility Requirements"
Lieutenant Colonel Raymond A. Kruelskie, USAF, USSOCOM (J7-R)

"Development of High Mobility Ground Vehicles Internally Transportable by the V-22 Aircraft"
Mr. Michael A. Gallagher - Naval Surface Warfare Center - Carderock

"C-17 Globemaster III in the Special Operations World"
Mr. James C. Schaffer and
Mr. Leonard R. Tavernetti - McDonnell Douglas Corporation

"Future SOF Mobility Requirements"
Major Ronald F. Richard, USAF
AFSOC/XPP

THE IMPACT OF CV-22 ON FUTURE SOF MOBILITY REQUIREMENTS

Raymond A. Kruelskie
Lieutenant Colonel, USAF

Headquarters, U.S. Special Operations Command
Directorate of Plans, Policy, and Strategic Assessments, Requirements Division
MacDill AFB, Florida
7 January 1997

INTRODUCTION

The CV-22 will have a great impact on special operations forces (SOF) and the way SOF missions will be executed. The fielding of the V-22 will change Department of Defense (DoD) and U.S. Special Operations Command (USSOCOM) capabilities and the tactical doctrine of the forces that employ the aircraft. The V-22 will be a force multiplier. It will enhance USSOCOM's ability to perform SOF missions as a result of its speed, longer range, and ability to rapidly deploy with a significantly reduced logistics "tail." The V-22 combines the advantages of both helicopters and fixed wing aircraft, and as a result will also lower the total number of airframes required in the force mix. This translates to direct savings in procurement and organizational and maintenance costs. The V-22 is well suited to USSOCOM's missions and will become a valuable addition to DoD's and the Command's aircraft mix.

THE V-22 OSPREY

The V-22 "Osprey" is a tilt-rotor aircraft that combines the vertical take-off, hover, and vertical landing qualities of a helicopter and combines that with the long-range fuel efficiency and speed of a turboprop fixed wing plane. Current plans call for Bell-Boeing to build 523 V-22s of three variants for the Department of Defense: 425 MV-22s for the U.S. Marine Corps; 50 CV-22s for the Air Force Special Operations Command (AFSOC), a component of U.S. Special Operations Command; and 48 HV-22s for the U.S. Navy. The Marine Corps plans to use their aircraft to replace the aging H-46 helicopters, and the MV-22s will perform roles in combat support and assault support operations. AFSOC plans to use the CV-22s to support USSOCOM's missions, and the Navy will use their HV-22s for Combat Search And Rescue (CSAR), special warfare support, and fleet logistics support.

The V-22 will be capable of speeds from 0-340 Knots Indicated Airspeed (KIAS), with a cruise of 235 KIAS. The V-22 will be capable of carrying 8000 pounds of cargo. The cargo compartment is large enough to carry a small

vehicle and trailer, or two half pallets, or 24 combat equipped Marines, or 18 Special Operations Forces (SOF) operators (Ranger, Special Forces, SEAL, or Special Tactics) and their gear. The V-22 will be air refuelable by both low and high speed tanker aircraft. The Osprey will be shipboard compatible, be capable of precision navigation, and be able to operate in almost any climate. A V-22 will include secure radios, Global Positioning System (GPS), a Forward Looking Infrared (FLIR), its own oxygen generating system, and other features that make it a very capable aircraft for a wide variety of missions.

The CV-22 variant will add many features to the basic V-22 to tailor it to the SOF mission. The CV-22 variant adds a multifunction advanced terrain-following terrain avoidance (TF/TA) radar, extra fuel tanks for an extended range, an advanced Electronics Warfare (EW) suite to include radar and infrared jammers, flares and chaff, and laser warning. The radar allows the CV-22 to penetrate adverse weather and the EW suite gives the SOF variant more protection so it can avoid detection and penetrate unfriendly skies.

The Marine Corps will begin receiving their MV-22s in the year 2000, with the first operational units ready by 2002. AFSOC will begin receiving their CV-22s in 2003, and complete delivery of all 50 by 2010. The fielding of these aircraft and the capabilities they will bring will enhance USSOCOM's ability to perform National Command Authority (NCA) and other tasked missions.

ADVANTAGES OF THE V-22

The V-22 aircraft offers many advantages, with both the aircraft itself and the logistics needed for support. The V-22 combines the speed and range of a turboprop plane with the vertical takeoff and landing capability of a helicopter. The biggest advantage this offers is the ability to exfil at the same long ranges typically associated with fixed-wing infil platforms. The advantages combined can translate into a reduced number of mission aircraft required because it performs in both aircraft roles while needing less maintenance. In 1994, USSOCOM planned to retire or transfer some 100 aircraft, helicopter and fixed-wing with the acquisition of its 50 CV-22s.

Another advantage of the CV-22 is on the logistics, or support side. Two of the key advantages are its self-deployment capability, and the portability of its support equipment, or "tail." The long range tanks and air refueling probe on the CV-22 allow it to fly and deploy almost anywhere without breakdown and buildup, and in a very short timeframe. For example, the CV-22 can fly from California to Hawaii in eight hours. It can fly from Europe and reach most parts of Africa in less than a day. The CV-22 Joint Operational Requirements Document (JORD) calls for it to utilize smaller,

state-of-the-art equipment and testers. The requirements specify that most of the test equipment must be two-man portable. Further, the equipment required to support the four-ship CV-22 deployment package for 30 days must be able to fit in five C-141 loads (or equivalent). Currently, this is a big reduction from the four C-5s and seventeen C-141s that a four ship MH-53 deployment requires. This reduces the logistics "tail" to service and maintain the aircraft, as well as the associated costs.

THE CV-22 -- CASE EXAMPLE

The Non-combatant Evacuation Operations (NEO) from Liberia last April illustrates how these features might have been used by USSOCOM. On April 10, 1996, two MH-53's arrived in Monrovia, Liberia, and began to conduct a NEO of some 400 Americans and others. In the next two weeks, other helicopters and fixed wing aircraft arrived, to evacuate about 2000 people from Monrovia. Since C-130's could not reach the capital, helicopters flew there to pick up the evacuees and transported them to the Intermediate Staging Base (ISB) at Freetown, Sierra Leone. The evacuees were then flown to Dakar, Senegal by C-130. The CV-22 could have done this mission much more effectively with its long range and ability to take-off and land vertically. Had the CV-22 been available, the Osprey would have been able to reach the objective area in one day. Further, it would not have required the C-5 support necessary to deploy and redeploy the large helicopters. Further, the ISB at Freetown would not have been necessary with the CV-22's ability to land in Monrovia and reach Dakar. Clearly, the CV-22 would have saved time and money and performed the same mission more effectively than the current resources available to execute the NEO.

THE IMPACT OF CV-22 ON SOF REQUIREMENTS

While the CV-22 offers many advantages and will save money, it has some drawbacks and concerns that will need to be addressed and will drive other SOF requirements. The design of the V-22 was limited by the Marine Corps concept and the available technology at the inception of its development. A major limitation is its size. In order to be shipboard compatible and fit on Navy helicopter carriers, the V-22 design is smaller than optimum. The rotors had to have about nine feet clearance from the superstructure, and the outboard wheel had to be a foot from the ship's edge. These design constraints led to a smaller aircraft and cargo compartment, which restricts the V-22's capabilities to perform missions that require larger vehicles, loads, or equipment. This necessitated development of other SOF requirements for specialized equipment, such as the Light Strike Vehicle (LSV), and self-inflating Combat Rubber Raiding Craft (CRRC) due to the limited size of the cargo area.

The CV-22 will be well suited to many missions, and a cost effective addition to the USSOCOM aircraft mix. The Special Operations variant CV-22 will be even better suited to do some of these operations than its MV-22 counterpart because of its extra range, enhanced EW suite, and TF/TA radar. SOF missions can utilize the CV-22's range and speed, its vertical takeoff, hovering, and landing capabilities to perform long range precision infiltration and exfiltration through adverse weather and medium threat environments -- all in one period of darkness, and at a lower cost than current air vehicles. The CV-22's operational concept will need to be further explored, tactics changed, combined with new materiel requirements to take full advantage of the aircraft's capabilities.

CONCLUSION

The CV-22 will be aptly suited for a wide variety of USSOCOM missions. The speed and range of the CV-22, an advanced EW suite, the multifunction TF/TA radar will enable forces to fly deep, defeat the threat, and complete missions in one period of darkness. The aircraft's capabilities combined with the reduced logistics tail and support equipment needed to support a CV-22 deployment reduce the costs while increasing mission response and effectiveness. Many areas and requirements will still need to be refined as the CV-22 is fielded and the operational concept is fleshed out. Changes to tactics and procedures may be necessary, but these may further expand mission areas the CV-22 can perform. These changes though will bring a more cost efficient and effective way for USSOCOM to meet the challenge in the next century.

V-22 TRANSPORTABLE GROUND PLATFORMS FOR SPECIAL OPERATIONS MISSIONS

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INTRODUCTION:

The US Marine Corps and US Special Operations Command (USSOCOM) have a Joint Operational Requirement for a V-22 transportable Light Strike Vehicle (LSV). This ground vehicle is slated to fulfill many existing requirements for both user communities while exploiting the advantages that the MV-22 (USMC) and CV-22 (USSOCOM) will offer. Marine Expeditionary Units - Special Operations Capable, MEU(SOC), currently employ the aging M151A2 Jeep as a LSV that can be deployed from its helicopters. USSOCOM currently use the Chenowth Fast Attack Vehicle and Ranger Special Operations Vehicle, RSOV (modified Range Rover), neither of which is CV-22 transportable.

REQUIREMENTS:

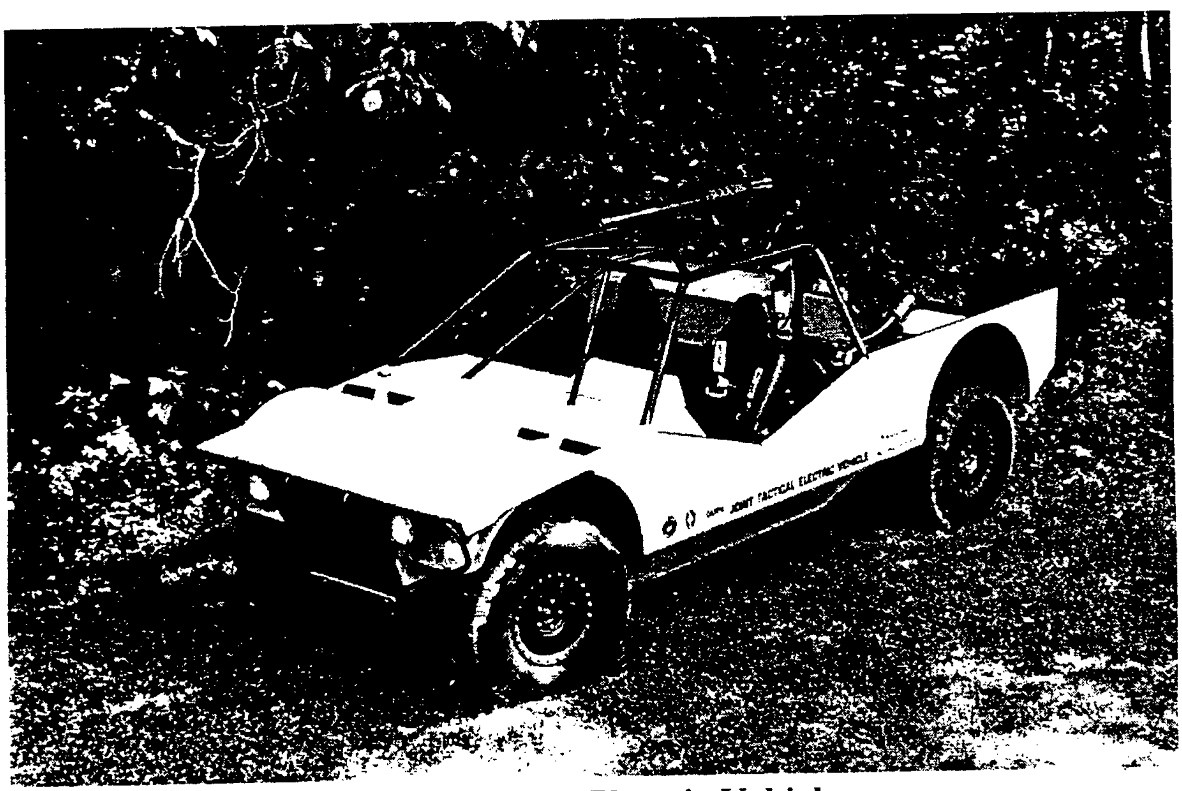
The future LSV will offer improvements over any and all existing platforms, while addressing current logistical and tactical employment shortfalls. A paramount requirement for the LSV will be internal V-22 transport so as not to degrade the aircrafts strategic and tactical mobility. Only the M151 will fit within the profile of the V-22 aircraft, but the Marine Corps has been trying to replace this vehicle for several years. It is no longer supportable within the military supply system, has a gasoline burning engine (that is incompatible with future battlefield fuels and amphibious transport restrictions). exhibits poor mobility, has unsafe rollover stability, and provides limited stowage capacity for mission equipment.

For the multiple Marine Corps missions in which the LSV would be employed, a 3-man crew, primary and secondary weapons for suppressive firepower, and 1500-2500 pound payload is required. These missions include raids, reconnaissance, hasty attack, and Tactical Recovery of Aircraft and Pilot (TRAP) and would be deployed from the Marine Air-Ground Task Force as part of a Naval Expeditionary Force. USSOCOM missions call for a 4-6 man crew and up to 3000 pounds of payload for longer duration missions, while still relying on CV-22 transport to and from the theater of operation.

In development of ground platforms to fulfill future mission capabilities, the requisite interfaces have been identified and addressed that severely affect the design of the ground vehicle. Most constraining is the internal volume of the V-22 airframe. Maximum dimensions of 68 inches wide and 65 inches tall with chamfers at the top sets vehicle dimensions in the transport mode. To fulfill the USMC requirement that the aircraft be able to hover in a High-Hot condition at full fuel load, maximum Gross Vehicle Weight for the ground platform must not exceed 8400 pounds to stay within aircraft loaded takeoff weight. USSOCOM aircraft with aft sponson tanks, use of rolling takeoffs, or in-flight refueling can allow for a greater vehicle GVW. A vehicle width of 68 inches or less makes it over 22 inches narrower than a High Mobility Multipurpose Wheeled Vehicle, while being comparable in total weight but carrying equal or greater payload weight.

PROGRAMS AND PLANS:

In support of the LSV Acquisition Program that will commence in fiscal year 1999 or 2000, the Amphibious Warfare Technology Directorate of the Marine Corps Systems Command has been investing in the development and demonstration of two test-bed vehicles that address critical technical issues. The Helicopter Transportable Multi-Mission Platform (HTMMP) and the Joint Tactical Electric Vehicle (JTEV) were developed to demonstrate technical feasibility and advanced capability of integrated technologies in a ground vehicle platform. The size and performance of these vehicles



Joint Tactical Electric Vehicle

were first developed around an original LSV requirement that called for CH-46 helicopter transport and thus limited GVW to 5000 pounds, but the platforms have been enhanced for the greater capability, and weight, that comes with the V-22.

Currently in the testing phase, the HTMMP and JTEV combine commercial components from the electric vehicle industry, propulsion systems from the automotive sector, and suspension and handling components from the off-road rally racing circuit in a military style, small, lightweight tactical vehicle. Developed in 1992, the HTMMP had a target gross vehicle weight of 5000 pounds and a width of 65 inches being selected so as to fit inside the CH-46 and V-22. The HTMMP is a four-wheel drive platform with a front mounted diesel engine and a 4-speed automatic transmission. The JTEV was developed as a four-wheel drive, hybrid electric vehicle that utilizes a smaller diesel engine and alternator, two AC induction motors, and a lead acid battery pack for propulsion. Both platforms utilize a lightweight space frame construction and have long travel suspension systems that allow for cross country mobility far better than that of a HMMWV.

Although performance of both vehicles is comparable, each platform offers features and unique capabilities. Performance of the JTEV includes a top highway speed of 65 mph while the HTMMP has achieved over 100 mph. Both vehicles can travel over 30 mph off-road, with the JTEV attaining speeds approaching 50 mph. This level of performance is comparable to that of a Main Battle Tank and is a result of the designers expertise with off-road rally racing events. The electric transmission of the JTEV allows it to accelerate from 0 to 30 mph in 3.5 seconds and 0 to 60 mph in 10 seconds, a feat unmatchable with either a manual or automatic transmission or any other military vehicle. When operating with the diesel engine running, the JTEV has an off-road range of 460 miles with the 25 gallon fuel tank, providing 20-25% better fuel efficiency than the HTMMP and almost 100% better fuel efficiency than a HMMWV. When operating in the pure electric mode, it can travel 10 miles silently. Both vehicles can climb a 60% grade at 10 mph, safely traverse a 40% side slope and ford salt water to a depth of three feet without air-intake and muffler extension kits. As to the JTEV's stealthiness, when running on batteries, the acoustic signature is limited to just tire and drivetrain noise while the thermal and visual signatures of the engines exhaust plume are eliminated. Both platforms make maximum usage of off-the-shelf components for affordability reasons. Whereas the 4-speed transmission in the HTMMP came from a sport utility vehicle, the electric drive components for the JTEV are the same as those in the new General Motors EV-1 electric sedan. Both vehicles use a small turbo-diesel engine from Europe, but the HTMMPs 160 HP engine has been substituted with a smaller 100 HP engine for the JTEV. This is due to the benefits that an electric transmission offers with its load leveling capability and energy storage, thereby reducing peak power engine demands.

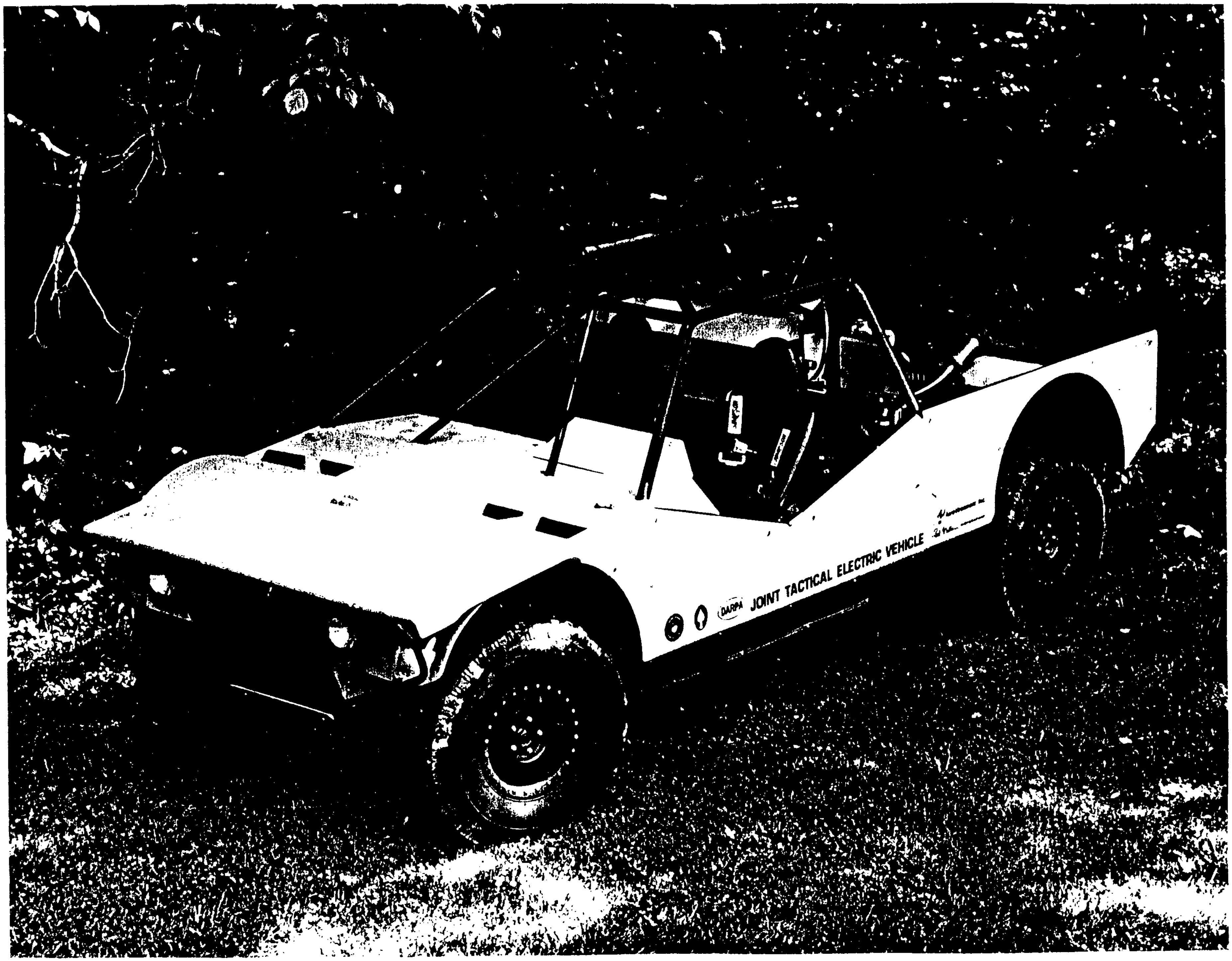
The HTMMP and JTEV will continue to be utilized for the evaluation of technical, operational, and employment issues with both the USSOCOM and the USMC

Program Manager for Ground Weapons (Joint service acquisition manager for the Light Strike Vehicle). The JTEV was utilized in an interface test at Patuxent River Naval Air Station in 1996 to address, for the first time, issues associated with loading, stowage, and deployment of a vehicle from the aircraft. Lessons learned have helped with on-going analysis that will define future vehicle characteristics, chiefly the maximum allowable width. Aircraft operators desire a minimum width platform for least possibility of interference with aircraft internal systems, while the vehicle operators want maximum width for platform stability and payload volume. The HTMMP has been tested with an Articulated Electric Drive Trailer. The powered wheels of the trailer allow an increase of payload carrying capacity without the mobility penalty that trailers generally incur. Articulation between the vehicle and trailer offered improved stability and safety in roll-over situations, while offering the advantage to effectively make the platform a 6X6 configuration for reduced vibration in the trailer bed. Both platforms, the JTEV and HTMMP, remain operational and supportive of the LSV program. The platforms will be utilized for survivability and signature testing, weapons system integration, and advanced automotive components under a Joint program between the USMC and the Defense Advanced Research Projects Agency (DARPA).

A new program has started that will benefit both the LSV and future capabilities of Special Operation forces; the Joint USMC-DARPA program for a Reconnaissance, Surveillance and Targeting Vehicle (RST-V). This V-22 deployable platform will combine the system level capabilities of *High Mobility* (as demonstrated by the HTMMP, JTEV, and LSV), *Survivability* (suppression of all signatures, silent operation, and camouflage/concealment treatments), *Sensors* (on-board, long range, multi-spectral imaging & sensing, target acquisition, target designation), and *Command/Control* (long range communication, position/navigation, cooperative engagement tactics). This technology demonstration program is currently in a concept development phase and will deliver at least two platforms in fiscal year 2000 for testing purposes.

CONCLUSION:

With the V-22 shortly being introduced for service in the USMC and USSOCOM, an internally transportable ground platform has been repeatedly endorsed as a critical capability and urgently requirement. Most technological hurdles have been overcome and demonstrated to reduce program risk. Increased capability will be demonstrated in the coming years with the two existing platforms and the next generation RST-V platform as an advanced technology demonstrator and may well show the utility for follow-on variants built upon the basic chassis.


DARPA JOINT TACTICAL ELECTRIC VEHICLE

THE C-17-- THE NEXT GENERATION SOLL II AIRLIFTER

1. Air Mobility Command (AMC) and the United States Special Operations Command have agreed on the C-17 as the Special Operations Low Level II (SOLL II) replacement for the C-141. As the only new airlifter in the inventory, it is both the obvious choice and the right choice. The development of the C-17 drew on lessons learned from the C-141 and designed "out" many of the workarounds necessary to use it as a special operations platform. The result is an aircraft that is more than a replacement, but is in fact the **"next generation"** airlifter, combining the best features of the C-130, C-141, and C-5. This paper will build on this hypothesis, first by outlining the inherent capabilities of today's aircraft, then look at current special operations mission requirements, and finish with some unique features that could expand the SOLL II mission.

2. The C-17 is the most advanced airlift aircraft in the world, with a design that stresses high reliability in the demanding military environment. It achieves this by using proven components and technologies, such as the Pratt and Whitney 2000 series engine used commercially for six years prior to the C-17. Many of the avionics systems have proven reliability in other weapon systems. Maintainability is the same story, from basic decisions like using a single type and size fastener on maintenance panels to quick disconnects on the hydraulic lines and electrical cannon plugs.

a. From the supercritical airfoil technology and winglets, Electronic Flight Control System (EFCS), fully integrated electronic cockpit, to the propulsive lift system that is the heart of the aircraft's short-field capability, the C-17 is an aircraft that combines the attributes of our best strategic airlifters (long range, aerial refueling, and large outsize payload) to the key qualities of a tactical airlifter-- agility, survivability, airdrop, and the ability to operate into small, austere airfields. The EFCS is a full authority electronic flight control system that uses four flight control computers to control the 29 aircraft flight control surfaces. These electronically controlled, hydraulically actuated control surfaces give the aircraft agility possessed by no other airlifter. The electronic cockpit uses three mission computers and electronic displays to present crew-selected information on navigation, communications and system management. The mission computer system combines with the four inertial reference units and global positioning system to provide navigational accuracy precise enough to perform IFR airdrops and autonomous approaches to non-precision minimums, all without the need for an navigator. The technological heart of the aircraft is the propulsive lift system, which uses

engine exhaust to generate lift. The four large, externally blown flaps are extended into the engine thrust flow field, thus thrust changes result in direct flight path changes -- increasing power causes the aircraft to climb, and power reduction to descend. This allows the aircraft to fly a much slower, steeper final approach path (5 degrees vs. 3 degrees) and combines with the heads-up display (HUD) to provide the pilot with precise flight path control and minimal touchdown dispersion. It is this combined with the high sink rate landing gear that permits the short field landing capability.

b. The aircraft's performance capability is matched in the cargo compartment. It is designed to efficiently transport modern military equipment, including large wheeled and tracked vehicles. Its 18 foot width allows side by side loading for up to 18 pallet positions, and cargo compartment height allows loading of an Apache helicopter with the rotor hub installed. The floor was designed with the strength to transport the Army main battle tank. Its centerline aerial delivery system accomplishes both heavy equipment and Container Delivery System (CDS) airdrop, and personnel airdrop is accomplished either through the troop doors or over the ramp for HALO or HAHO. Litter stanchions for nine litter patients are integral to the aircraft, with additional reconfiguration capability for up to 36 litter patients. The fully loadable ramp (40,000 lb's) allows easy full width drive on/off of vehicles and combat offloading of palletized cargo. Integral ramp toes serve as a loading bridge between the aircraft and either the ground or cargo handling equipment. This highly reliable advanced cargo compartment system with its automation of all controls at the forward loadmaster station, allows one loadmaster operation on all mission profiles.

3. Now let's look at today's SOLL II missions. Since the C-17 is capable of accomplishing all of them, we will only address areas where the Globemaster III expands mission capability.

a. Using a standard airfield seizure scenario, the options expand immediately in the ground planning phase. The C-17 can airland/airdrop (including outsize) 170,000/110,000 pounds respectively, and requires less runway for takeoff and landing than the C-141. Maximum takeoff and landing weight are the same for hard surface runways, so lower landing weights and resultant minimum fuel problems are minimized. The increased cargo weights and side by side loading capability also simplify the load planners task, particularly "bump" plan options. The larger width/height cargo area also expands both the type and number of vehicles and helicopters for onload.

b. Similar enhancements exist in the flight phase. Approximately 40% of the aircraft design is for the tactical environment, to include low level, high speed flight and heavy weight landings at small, austere airfields. Enroute navigation is accomplished using a fully integrated advanced avionics system that has four inertial reference units with continuous, automatic global positioning system (GPS) up-dates feeding three mission computers. The system is so accurate that airdrop and self-contained mission computer approaches can be accomplished in instrument meteorological conditions (IMC). Noise signature is also reduced significantly, since the engines meet FAA stage III requirements.

c. IMC airdrop is just one of the force multipliers available in the objective area. The aerial delivery system can airdrop 110,000 pounds on a single pass, including a 60,000-pound individual load. The aerial delivery system drops from the centerline of the aircraft, so the same aircraft has approximately 54" on each side of the load for cargo or passengers.

d. Blacked out landing capability has been significantly enhanced through the synergy of a NVG-compatible cockpit with a Heads-Up Display (HUD), and the powered lift and high sink rate landing gear that allow steep, precise approaches with excellent short- field capabilities (less than 3000 feet required for a 420,000 pound landing weight).

e. Ground operations have been simplified for both the aircrew and the users. In addition to the more accurate touchdown control and shorter landing distance, the aircraft possess C-130 agility. The thrust reversers have no restrictions for backing and can back the aircraft up a 2 % grade with a 160,000 pound payload. Since the thrust is directed up and forward at about 37 degrees from the vertical, it also minimizes blown dust and debris during ground operations. Unfortunately the cargo section is not currently NVG compatible, but that is one of its few drawbacks. Movement in the cargo area is almost totally unimpeded, since both the aerial delivery and logistic rail systems and their locks are stowed in the floor planking. Cargo tie-down rings are recessed into the floor, and there are no treadways along the cargo compartment sides. Cargo ramp toes bridge the gap from the ramp end to the ground and are integral to the aircraft.

f. Even while parked the aircraft offers enhanced operations as a either a FARP or aeromedical platform. Both systems are designed into the aircraft and require no specialized equipment onload. The normal fuel system pump pressures will support FARP operations without an external

fuel cart and the aeromedical capability has a utility station with lighting, therapeutic oxygen, and electrical access at each litter station.

4. Despite these enhancements, the C-17 offers more as we look to the future; particularly in its autonomous approach and landing capability, operations into semi-prepared or austere airfields, and expansion of the aerial delivery systems.

a. An inherent limitation today is the visual requirement for landing blacked out. The C-17 mission computer approach capability is independent of external navigation aids and is accurate to non-precision minimums. Autonomous capability to precision minimums only requires addition of an already programmed modification to the GPS. This capability, combined with the inherent HUD/NVG design would eliminate the visual approach requirement. In fact, it opens the opportunity to not only take advantage of the night, but reduced weather conditions as well.

b. The strategic airlift fleet opened the door for long-range airlift of large cargo loads, expanding the firepower and range of our special operations forces, but also tied them to long, hard surface runways. The C-17 requires neither long nor paved fields. It was designed to operate into semi-prepared and dirt airfields as short as 3000 feet. The only restriction differing from normal landing procedures is a maximum landing weight of 447,000 pounds, a structural limit associated with taxi asymmetries. Actual dirt operations with the aircraft carrying an M-1 tank into Bicycle Lake were accomplished as part Charleston's Reliability, Maintainability, and Availability Evaluation in July '95. This added tactical capability opens a tremendous range of landing zones available for the special operations planners. Combining this with the autonomous approach capability would be a real force multiplier.

c. An expanded airdrop capability accompanies the C-17 entry into the special operation arena. Although the Army has dropped its LAPES requirement, the aircraft is a superb platform for this mission. If only for its accuracy, load survivability, and low drop altitude, it warrants evaluation by the special operations forces.

5. The C-141 is performing superbly as this nation's SOLL II airlifter, but with a retirement date just after the turn of the century, the C-17 stands ready to assume this venerable airlifter's role. Now is the time to begin planning for the impact of this new addition to the special operation forces, so that it truly becomes the **next generation** SOLL II airlifter.

Abstract

C-17 Globemaster III in the Special Operations World

by
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The USAF/McDonnell Douglas C-17 is the most modern airlift aircraft in the world and the United States Government has signed up to buy 120 of these aircraft to replace the C-141 Starlifter fleet. The new technologies that enable the C-17 to perform both strategic and tactical airlift missions will make this aircraft an ideal platform for numerous Special Operations missions. The inherent capability of the C-17 to travel at jet speeds over long distances with large payloads and then land at small austere airfields means that deploying all the equipment and support required for contingencies will be easier. The glass cockpit and Global Positioning System will allow crews to independently navigate to any location on the globe while flying low level. Satellite communications will permit worldwide communications and data links. Helicopters can be carried inside the C-17 and fueled at their destination. Civilian vehicles needed for infiltration can be delivered near the objective. And, large forces can be launched by military free fall from 30,000 feet offset from the objective area. Conventional static line airdrop can also be accomplished from lower altitudes. This paper discusses the design features of the C-17 and their suitability for Special Operations.

Future SOF Mobility Requirements

"Signature reduction will enhance the ability to engage adversaries anywhere in the battlespace and improve the survivability of forces who employ it. Stealth will strengthen the ability to accomplish surprise, reduce overall force requirements in many operations, and make forces less visible to an unsophisticated or disoriented enemy" ***Joint Vision 2010***

In many of SOF's high priority missions, surprise is the essential ingredient to mission success. Surprise can allow a small force to overcome a large force and allow for mission completion before a reaction force can respond. Non-detection on infiltration is the key to achieving surprise and is a more demanding requirement than high survivability. Non-detectability does not imply invisibility, but a signature that is low enough to enable the platform to penetrate to the objective area without compromising the mission.

The future of SOF will require an aircraft able to depart the CONUS and fly anywhere on the globe at high subsonic speed and then land in the shortest runway possible to emplace forces. These aircraft must have smaller acoustic, thermal, and radar signature than our current fleet of aircraft. It must be air refuelable in order to reduce its' deployment signatures both logistically and spectrally. The performance demands spelled out above in all likeliness will dictate an airframe with a cargo box size smaller than a C-130 but large than a MH-53 or CV-22. It will require that stealth be incorporated from the beginning of the aircraft design phase. The key to successful signature reduction is a balanced approach across the entire threat spectrum which is coordinated with the warning and defensive suite carried on the aircraft. The old paradigm of modifying someone else's aircraft to meet our requirements will not work in the future. The cost is the same as developing a unique SOF aircraft but gives SOF a much greater capability for the future.

Future SOF Mobility Requirements

By

Major Ronald F. Richard

> *"Signature reduction will enhance the ability to engage adversaries anywhere in the battlespace and improve the survivability of forces who employ it. Stealth will strengthen the ability to accomplish surprise, reduce overall force requirements in many operations, and make forces less visible to an unsophisticated or disoriented enemy"*
>
> ***Joint Vision 2010***

The most comprehensive Special Operations (SO) air mission is to provide mobility to forces in denied territory. Air Force Special Operations Command (AFSOC) does this by conducting the tasks of infiltration, exfiltration, resupply, refueling, and transporting of Weapons of Mass Destruction (WMD). Past expenditures on aircraft modifications have significantly improved the performance of our current mobility platforms, but 66% of AFSOC's aircraft are 30 years old, are becoming more difficult to maintain, and would require costly investment to keep them flying well beyond the turn of the century. A new Special Operations Force (SOF) unique weapon systems must be developed so AFSOC can continue to provide mobility in denied territory.

The CV-22 is the first of our next generation of aircraft. It will replace a large number of older AFSOC aircraft and is presently scheduled to be IOC by 2005. We must now focus on the research & development of a new aircraft that will improve our capabilities and reduce our overall operating cost. Mobility requirements will continue to be USSOCOM's most important concern for the 21st century. Mobility consumes the largest part of modernization funds within USSOCOM and most importantly the development of new mobility systems is essential for SOF to remain relevant in countering future challenges.

Future

SOF must be prepared to confront a wide range of potential opponents in the changing global environment. Virtually all potential opponents have access to a global market containing a vast array of modern technology. These technologies include advanced air, sea, and land weapon systems; access to space based systems; dual-use technologies that can be used to produce WMD; and sophisticated communications and

information management systems. People will always be the most important resource within SO, but occupying the technological high ground is vital to SOF's continued success.

In many of SOF's high priority missions, surprise is the essential ingredient to mission success. Doctrine defines surprise as striking the enemy at a time and place or in a manner for which he is unprepared. Surprise is one of the principles of war, and is the key that allows SOF to achieve relative superiority. Non-detection on infiltration is the key to achieving surprise and is a more demanding requirement than high survivability. Non-detectability does not imply invisibility, but a signature that is low enough to enable the platform to penetrate to the objective area so the enemy cannot react effectively. Advanced information management systems, lethal and non-lethal weapons, and signature reduction are just some of the critical technologies required for SOF to achieve the element of surprise.

Requirements

In the future SOF will require aircraft that are capable of rapidly deploying from the CONUS, fly anywhere on the globe at high subsonic speeds, land in minimum distances on unimproved runways to deliver SOF and their equipment. This aircraft must have reduced acoustic, thermal, and radar signatures. They must be able to carry SOF teams, their equipment, and specialized vehicles. They will require stealthy design to allow penetration of unfriendly battle space defenses without detection. They will require low probability of intercept/low probability of detection (LPI/LPD) means of communicating and have the ability to navigate precisely under any circumstances, including adverse weather at nighttime and during times of denied satellite access.

The demands of penetrating unfriendly airspace undetected and remaining undetected or surviving engagement if detected will require an incredible amount of computer processing power by today's standards. The crewmembers of this stealthy aircraft will rely on cockpit automation for fault detection and correction, inflight damage assessment and correction, handling of inflight emergencies, inflight threat updates and route replanning, managing the LPI/LPD terrain detection systems, handling threat warnings, creating avoidance maneuver commands, and countermeasure activation for threats encountered inflight, and communicating routine operations reports to command and control sites.

Currently, AFSOC AC-130s provide fire support to SOF ground teams and other forces needing extremely precise direct fire combined with the situational awareness and overall tactical knowledge that comes with long endurance in the target area and high resolution, long range sensors. In the future SOF will not only have to upgrade to advanced lethal and non-lethal weapons, but to a platform that has increased speed, range, and survivability to support this mission.

Paradigms

In the past SOF has taken advantage of aircraft that were developed for conventional needs and then modified them to support SOF requirements. This approach worked well when we developed past generations of SOF aircraft, but shouldn't be the model for the future. The current and future sophistication of threats could easily drive the cost to modify an existing aircraft well beyond what it would cost to build a new and more capable SOF aircraft. If the goal is to build more capable SOF aircraft at an affordable cost, we must rethink the way we develop our aircraft. We must use a balanced approach to aircraft survivability and performance requirements by leveraging emerging technologies. We must use civilian off the shelf (COTS), dual-use technologies, lean manufacturing, and make use of modeling and simulation whenever possible.

Advanced Concept Technology Demonstrations (ACTDs) are a component to the acquisition reform process and can accelerate the transition of maturing technologies that demonstrate a potential to rapidly provide improved military capabilities to the warfighter. ACTDs are driven by the military user and the user's critical warfighting needs. The objectives are to allow the user to gain a more thorough understanding of a new technology and its potential to support military operations. The ACTD process has the potential to solve many of SOFs current and future requirements. Though the term is new, the theory behind ACTDs is very similar to what Mr. Kelly Johnson used over 40 years ago to build the Lockheed Skunk Works.

As we wrestle with what capabilities future SOF aircraft might require, we must not forget that our primary job **is *delivering special operations combat power anytime, anywhere***. As threats and technology continue to mature, so will the requirements of the special operators we will be supporting. Future SOF elements will require state of the art C4I systems that will allow them to plan, rehearse, update, and communicate anytime, anywhere in the world. Future ground vehicles to support these teams and other equipment should be incorporated in the initial design phase of a new SOF aircraft. A functional and integrated cargo compartment would not only enhance the combat capability of SOF, but could reduce the size, weight, risks, and cost of a future SOF aircraft.

Challenges

USSOCOM and MFP-11 were not capitalized to fund major acquisition programs like the CV-22 or a future SOF aircraft. We must work in partnership with the Army, Navy, Air Force, DoD, Non-DoD agencies, Congress, and industry to support future SOF requirements and funding options.

In addition to funding issues we also have some technology challenges to overcome if we are to develop a future SOF aircraft. There are many lessons learned

from the development, production, and operation of the F-117 and B-2 that must be considered in the development of a stealthy transport class aircraft. Here are just a few of those challenges:

- Integrating powerplants in stealthy airframes to allow vertical takeoffs and landings.
- Making LO materials more durable to support unimproved runway operations.
- Improved electrical generation capability to support future computers and weapons.
- Incorporating lean logistics into aircraft design.
- Developing deployable systems to maintain and measure aircraft signature levels.

Conclusion

We see a future where SOF is a larger percentage of a smaller US military. It continues to be a highly trained, technically-oriented maneuver force that acts as a close partner to conventional forces in all operations. In the future, SOF is stealthy, lethal, powerful and discerning. It serves the nation's, and the world's interests during peacetime, crisis, and war. In peacetime it prevents conflict through engagement, in crisis it offers an increased number of flexible options and in war it is a lethal force ranging throughout the entire battlespace and complementing conventional forces.

> *"In the development of air power, one has to look ahead and not backward and figure out what is going to happen, not too much what has happened."*
>
> ***Billy Mitchell, Winged Defense 1925***

Panel 2: Notes on "SOF Mobility Requirements

The discussion following the CV-22 presentation questioned whether or not the CV-22 could carry a ground SOF vehicle, what the replacement ratio would be between the CV-22 and rotary wing aircraft and the need to revise current insertion tactics, techniques and procedures.

A SOF ground vehicle compatible with the CV-22 is being jointly developed by the Marines and USSOCOM. USSOCOM requires that the vehicles fit into the CV-22 which presents a significant challenge given the cargo space dimensions of the aircraft.

The surface mobility vehicle presentation complemented the CV-22 presentation. It emphasized that this vehicle is unfunded and will require diesel fuel. Its crew will probably travel in the vehicles while being transported by the CV-22.

The C-17 presentation indicated that the aircraft has oxygen for 54 HALO personnel. Additionally, the requirements for additional SOF unique modifications is being determined by USSCOM.

The future SOF mobility requirements emphasized that an increase in mission or platforms is not supported by an increase in MFP11 funds. Any SOF unique platform would be funded by USSOCOM rather than sharing the cost with one or more of the uniformed services. Also current concepts are not supported by Joint Mission Analysis.

Water borne vehicles were discussed in general. The Advanced Seal Delivery system and the Mark V Boat acquisition are ongoing. The Patrol Coastal Ship acquisition is completed, a rigid hull inflatable boat is in development, and a swimmer assist vehicle is being considered.

The discussions then emphasized the significance of modernizing the delivery platforms versus funds available.


Future SOF
Mobility Requirements

Perspective

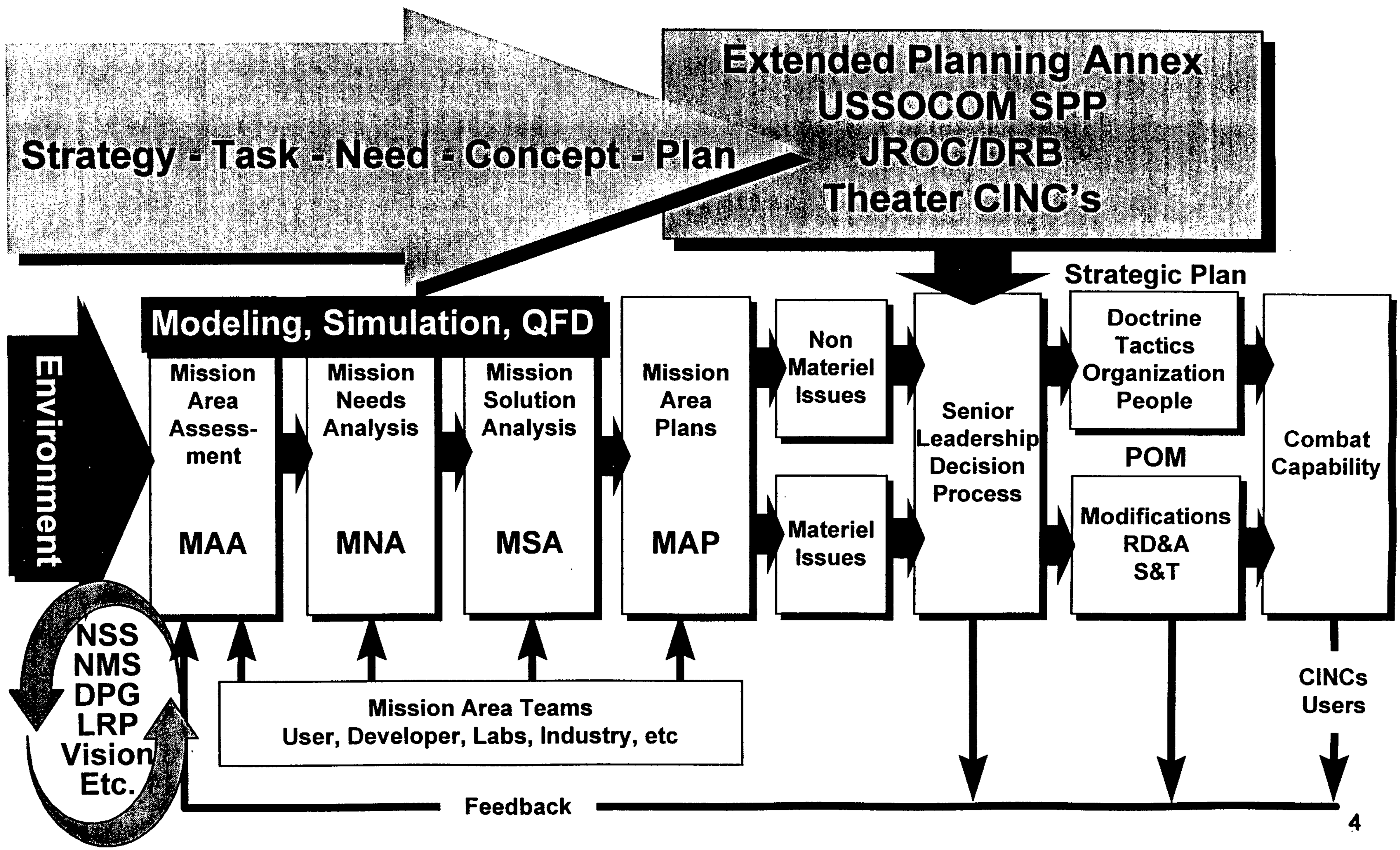
- ***US REMAINS A DOMINANT POWER***
- Our concept of "*Security*" is expanding
- Prepare for MRCs and Coalition War
  - Alliances are historically difficult
  - Peacekeeping/MOOTW
  - Contact, influence, and developmental help
  - Greater synergy with political/economic forces

Expectations for the Future

- ♠ Demand for SOF Continues to Grow
  - Counter Proliferation of WMD
  - Combatting Terrorism
  - Forward Presence & Engagement
  - MOOTW
- ♠ Challenge for SOF
  - Sustain High Peacetime Operations Tempo
  - Continued Modernization
  - Integrate ***at all levels***
  - Maintain Technological Edge

Modernization Planning Process

Future SOF Mobility Requirements



Future Operating Environments

Future SOF Mobility Requirements

- High End Global Competitor
- Low End Global Competitor
- High End Regional Competitor
- Low End Regional Competitor
- ***Insurgency***

- ***Peacemaking/Peacekeeping between Two Warring Parties***
- ***Dangerous Environmental or Industrial Activities***
- ***Proliferation of Weapons of Mass Destruction***
- ***Terrorism and "Streetfighter" Adversaries***
- ***Domestic Civil Unrest***

Environmental Trends

- Urbanization
- Proliferation
  - Technology: SAMs/NVGs/GPS/IADS/C4I
  - WMD: Chem/Bio/Nuclear
- Market for High Tech/Low Cost Weapons
- Non-Conventional Battlefield
  - Streetfighter Adversary
- Reduced Overseas Basing

AFSOC Mission Area Plans

Future SOF Mobility Requirements

SOF MISSIONS

- DIRECT ACTION
- SPECIAL RECONNAISSANCE
- UNCONVENTIONAL WARFARE
- COMBATTING TERRORISM
- COUNTER-PROLIFERATION
- PSYOP
- INFORMATION WARFARE/C2W
- FOREIGN INTERNAL DEFENSE
- CIVIL AFFAIRS

AFSOC MISSION AREA PLANS

[redacted]

[redacted]

[redacted]

[redacted]

SOF Mobility

Future SOF Mobility Requirements

Assumptions

- ♠Retire Helos by 2010
- ♠Retire MC-130P by 2010
- ♠Retire MC-130E by 2015

Tasks

- ♠Infiltration
- ♠Exfiltration
- ♠Resupply
- ♠Aerial Refueling
- ♠Transport WMD

Deficiencies

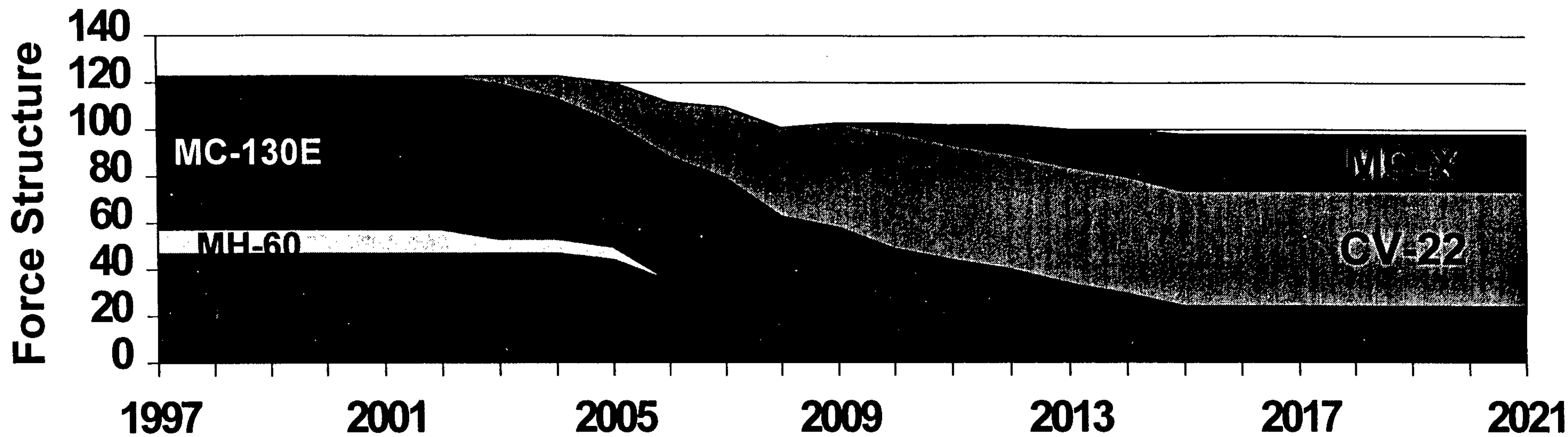
- ♠Vulnerable to Enemy Threats
- ♠Susceptible to Small Arms
- ♠No Means to Transport NBC
- ♠Large Logistics Signature

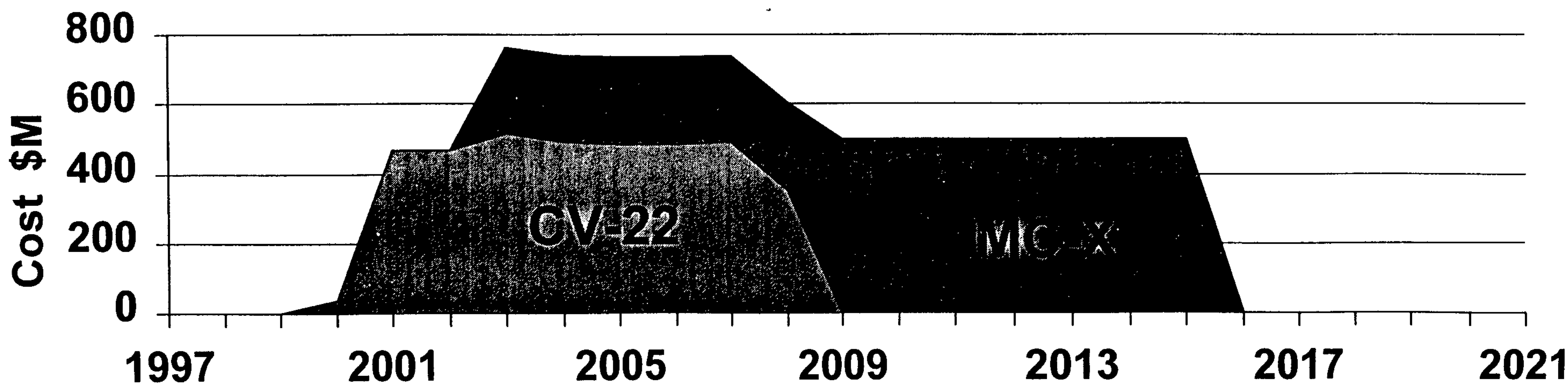
Solutions

- ♠CV-22 IOC by 2005
- ♠MC-X IOC by 2015
- ♠Field Means to Transport NBC
- ♠Lean Logistics/New Aircraft

SOF Mobility

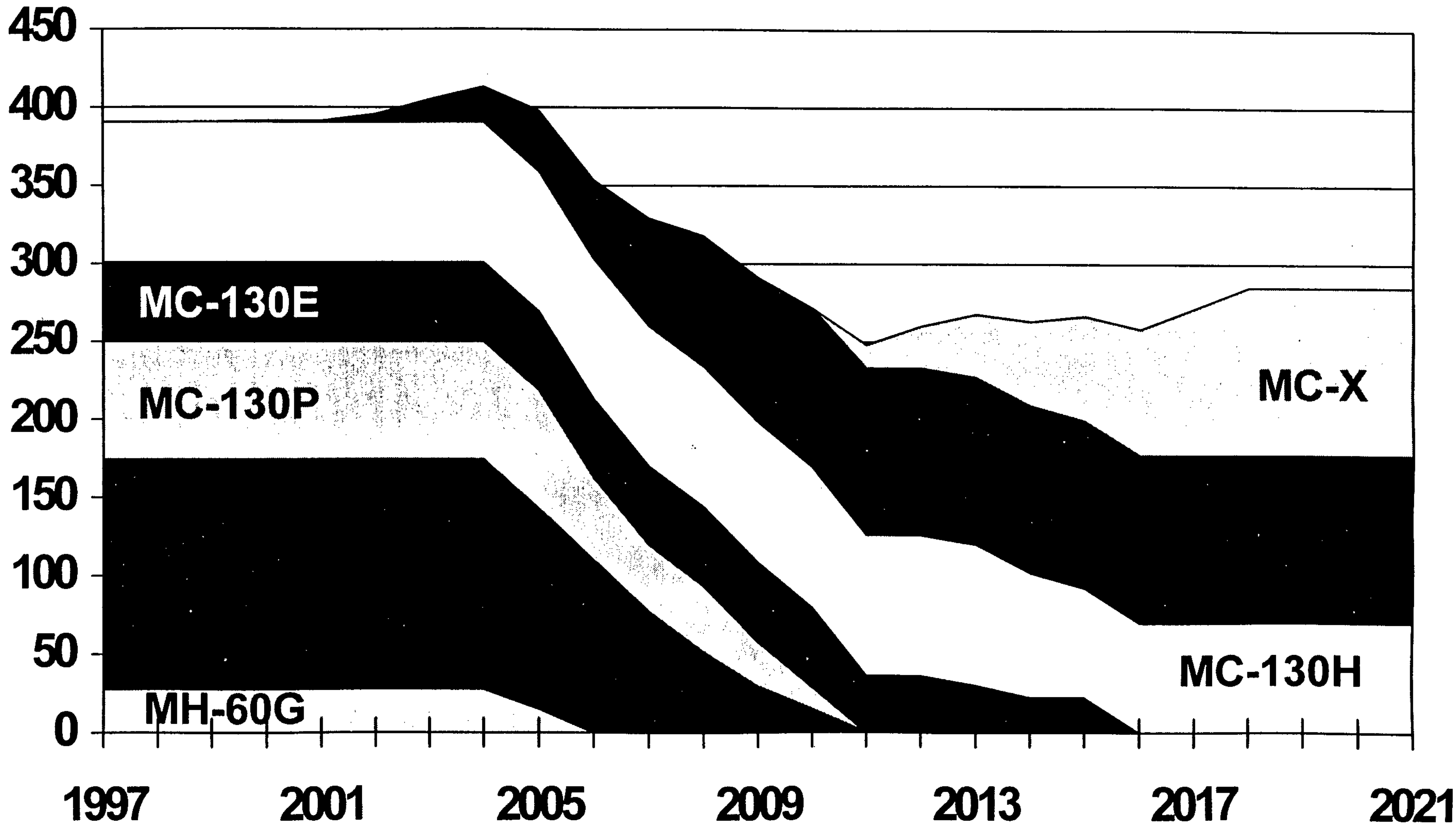
Future SOF Mobility Requirements





Modernization O&S Tail

Future SOF Mobility Requirements



Surprise

"Signature reduction will enhance the ability to engage adversaries anywhere in the battlespace and improve the survivability of forces who employ it. Stealth will strengthen the ability to accomplish surprise, reduce overall force requirements in many operations, and make forces less visible to an unsophisticated or disoriented enemy"

Joint Vision 2010

Surprise

- Essential to Mission Success
- Principle of War
- More demanding than high survivability
- Stealth doesn't mean Invisibility
- Eliminate Enemy's ability to React
- Information Systems, Advanced Weapons, and Signature Reduction Technologies required for SOF

Aircraft Requirements

Future SOF Mobility Requirements

- Rapid Global Deployment
- High Subsonic Speeds
- Minimum Landing Requirements
- Reduced Signature Levels
- LPI/LPD Communication and Navigation
- Integrated Cargo Compartment

Paradigms

- Conventional vs SOF Driven
- Past vs Future
- Future Threat Proliferation
- Modification vs New Development
- Balanced Approach
- Leverage Technology
- ACTD Approach

Challenges

- Funding
  - USSOCOM & MFP 11
  - Partnership
- Technology
  - Integrating powerplants in stealthy airframes to allow vertical takeoffs and landings.
  - Making LO materials more durable to support unimproved runway operations.
  - Improved electrical generation capability to support future computers and weapons.
  - Incorporating lean logistics into aircraft design.
  - Developing deployable systems to maintain and measure aircraft signature levels.

Guidance

Future SOF Mobility Requirements

Long-range, low-observable transport aircraft will be required for SOF to accomplish missions in hostile territory by 2015.

Air Force Executive Guidance

A stealth airlifter is needed because surprise is critical to success in SOF precision operations. Primary attributes are low observability, high speed, long range, global reach, increased payload, reliability, and durability.

Air Force 2025

The next generation of stealth aircraft should be a low-observable transport aircraft.

Gen Sheehan, CINC USACOM

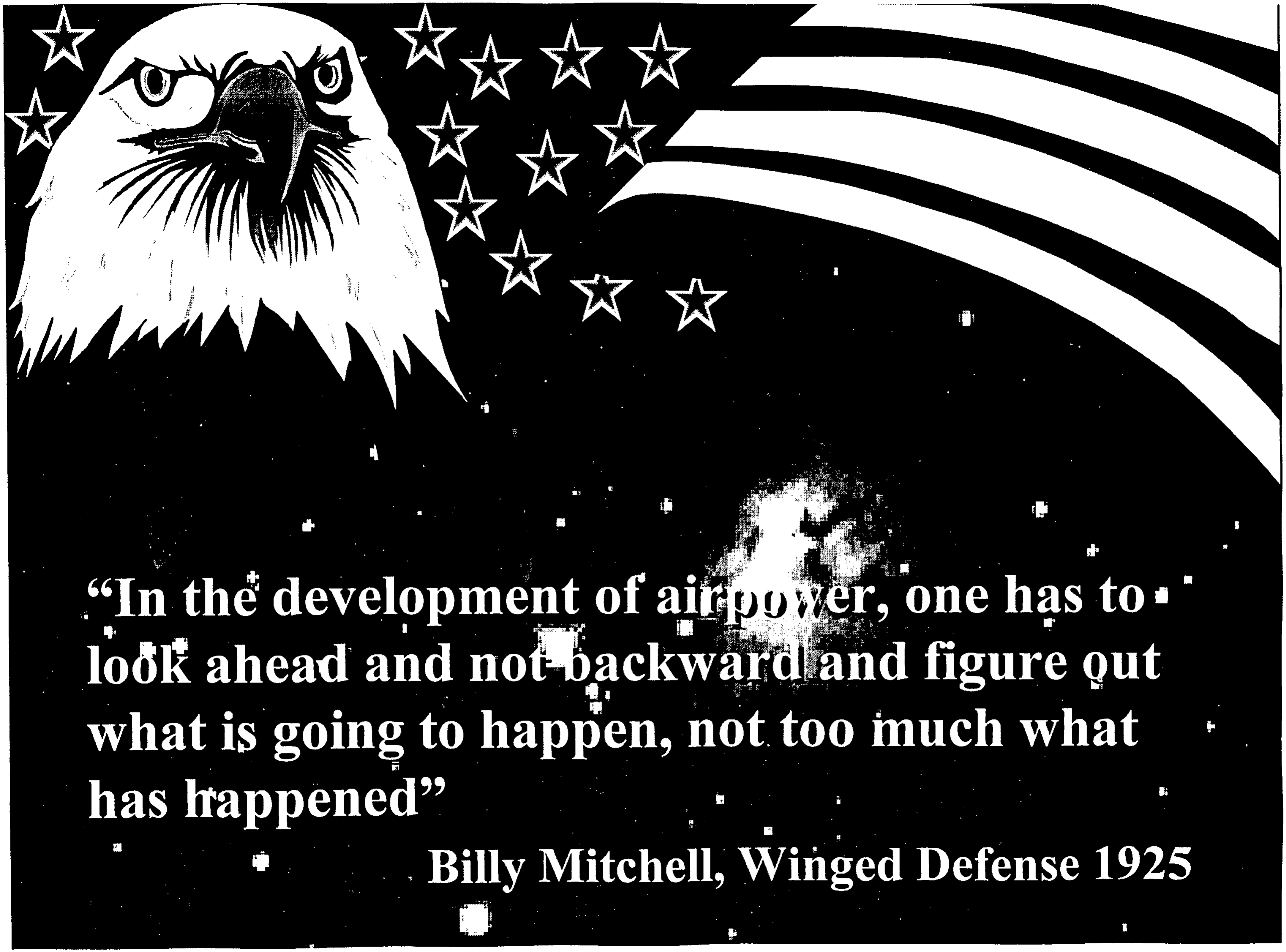
New World Vistas - Stealth Transport

Future SOF Mobility Requirements

- Need for SO will increase in the future
- Vulnerability is increasing in mobility Ops
- All transport A/C vulnerable to IR missiles
- SO A/C face even higher threats from air defense radar, other systems, and small arms
- USSOCOM has long recognized need for a low-observable transport A/C
- Advances in L/O fighters and bombers have nor been implemented into the transport A/C
- C-17 developed prior to recognition of the need and capability to implement stealth in a transport A/C
- Future transport aircraft can be readily developed to feature L/O and other survivability enhancements

Conclusion

- Aviation has always been crucial to Special Operations, especially so since 1980
- AFSOF C-130s are approaching the end of their service life and are increasingly vulnerable ... time for a new *workhorse*
- Shift to next generation aircraft that are *more capable and cheaper* to operate
- To remain viable in the 21st Century, we must be able to ***"Deliver Special Operations Combat Power Anytime, Anywhere."***


"In the development of airpower, one has to look ahead and not backward and figure out what is going to happen, not too much what has happened"
Billy Mitchell, Winged Defense 1925

THE IMPACT OF CV-22 ON FUTURE SOF MOBILITY REQUIREMENTS

LTCOL RAY KRUELSKIE
USSOCOM, J7-R

CV-22 REQUIREMENT

- USSOCOM HAS A LONG STANDING REQUIREMENT TO SUCCESSFULLY EXTRACT SOF AND AMCITS FROM BEHIND ENEMY LINES OR CONTESTED AIRSPACE. SPECIFIC DEFICIENCIES IDENTIFIED WERE:
  - INABILITY TO EXCUTE NUMBER OF MRC AND NATIONAL MISSIONS DUE TO LIMITED UN-REFUELED RANGES AND COMBAT RADII
  - INABILITY TO COMPLETE MRC AND NATIONAL MISSION CLANDESTINELY WITHIN ONE PERIOD OF DARKNESS
  - LIMITED GROWTH POTENTIAL FOR SELF-PROTECTION AVIONICS SYSTEMS DUE TO SPACE/WEIGHT CONSTRAINTS
- THE ANSWER WAS-- CV-22

CV-22 MEETS REQUIREMENT

- CV-22 COMBINES BEST QUALITIES OF FIXED AND ROTARY WING AIRCRFAT
  - SPEED DOUBLE THAT OF HELICOPTERS
  - INCREASED RANGE (500 NM COMBAT RADIUS)
  - VTOL CAPABILITY INCREASES RANGE OF OPTIONS
- THESE CAPABILITIES INCREASE SOF'S EFFECTIVENESS ACROSS THE BREADTH AND DEPTH OF THE BATTLESPACE

CV-22 ADVANTAGES

- DEEP PENETRATION IN "ONE PERIOD OF DARKNESS" - CARRY AT LEAST 8000 POUNDS CARGO, WHICH COULD CONSIST OF VEHICLE AND TRAILER, TWO HALF PALLETS, OR 18 SPECIAL OPERATIONS FORCES OPERATORS AND GEAR
- AIR REFUEL- BOTH LO & HIGH SPEED
- ADDS TF/TA RADAR, EXTRA FUEL CAPACITY, AND ADVANCED EW SUITE

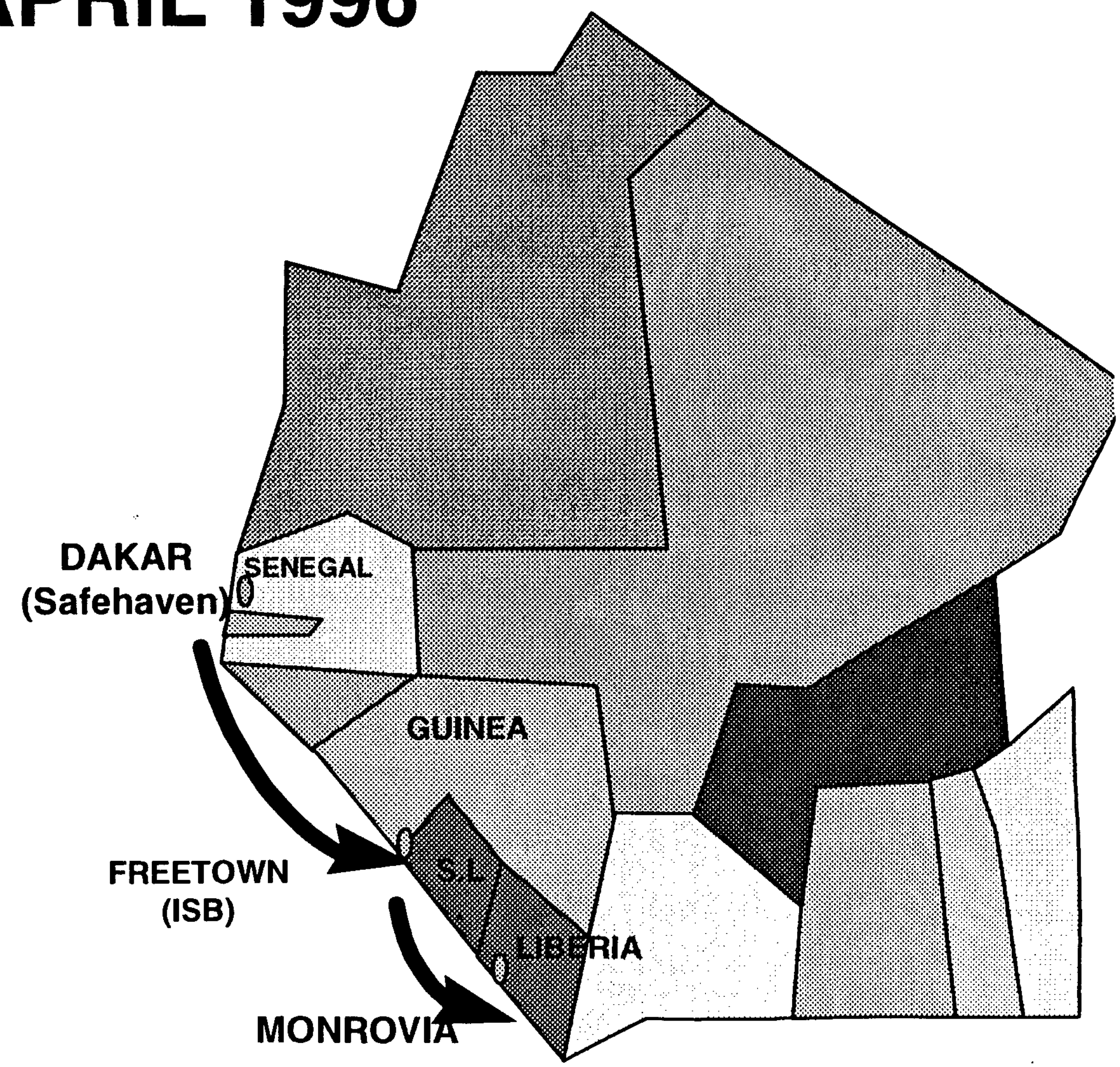
CV-22 LOGISTICS ADVANTAGES

- VERTICAL EXFIL AT SAME LONG RANGE AS TYPICAL FIXED WING TRANSLATES TO REDUCED NUMBER OF AIRCRAFT REQ'D
- SELF DEPLOYMENT IN ONE DAY OFFERS SPEED INTO ACTION
- REDUCED LOGISTICS "TAIL" - SUPPORT EQUIPMENT IN 5 C-141s
- STATE OF THE ART TESTERS AND EQUIPMENT REDUCES TURN-AROUND

CASE EXAMPLE

- NON-COMBATANT EVACUATION OPERATIONS (NEO) FROM MONROVIA, LIBERIA, 10 APR 96

ASSURED RESPONSE
APRIL 1996



REQUIRED :

3 DAYS TO DEPLOY

5 x MH-53s

4 x MH-47s

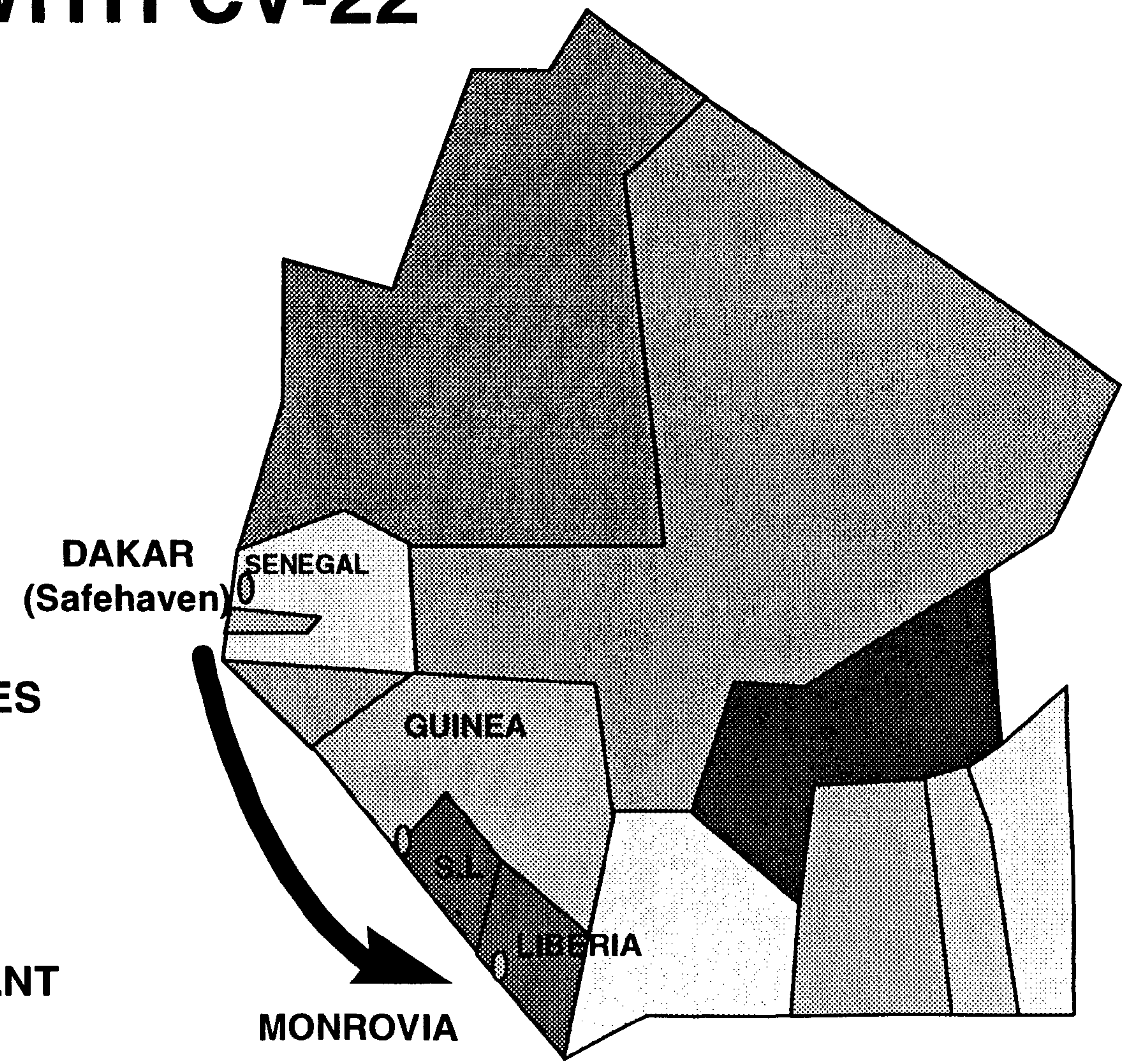
3 x HC-130s

2 x MC-130s

2 x C-130s

16 C- 5/C-17 SORTIES

ASSURED RESPONSE WITH CV-22



REQUIRES :

1 DAY TO DEPLOY

5 X CV-22

3 X HC-130

1 X C-17

REDUCES

15 C-5/C-17 SORTIES

2 X MC-130S

2 X C-130S

4 X MH-47S

4 DAYS DEPLOYMENT

CV-22 IMPACTS SOF

- CV-22 OFFERS BEST OF FIXED AND ROTARY WING, LOGISTICAL AND SUPPORT ADVANTAGES, FEWER CREW NEEDED
- RESULT: BETTER MISSION EXECUTION, MORE TIMELY, AND SAVES MONEY
- STILL, THERE ARE DRAWBACKS AND TACTICS AND REQUIREMENTS WILL BE AFFECTED AS THE CV-22 COMES ON LINE (50 CV-22s BY 2010, 1ST DELIVERY-2003)

CV-22 CONSTRAINTS/IMPACTS

- SIZE- DESIGNED TO FIT ON HELO CARRIERS, IT IS SMALLER THAN OPTIMUM AND CABIN SIZE IS APPROX 6’ x 6’ x 24’
- THIS IMPACTS WHAT FITS INSIDE- VEHICLES AND BOATS- LSV CONCEPT IS BEING WORKED WITH USMC
- ALSO IMPACTS TACTICS USED, WILL AFFECT HOW SOF DOES BUSINESS

CV-22 IMPACTS REQUIREMENTS

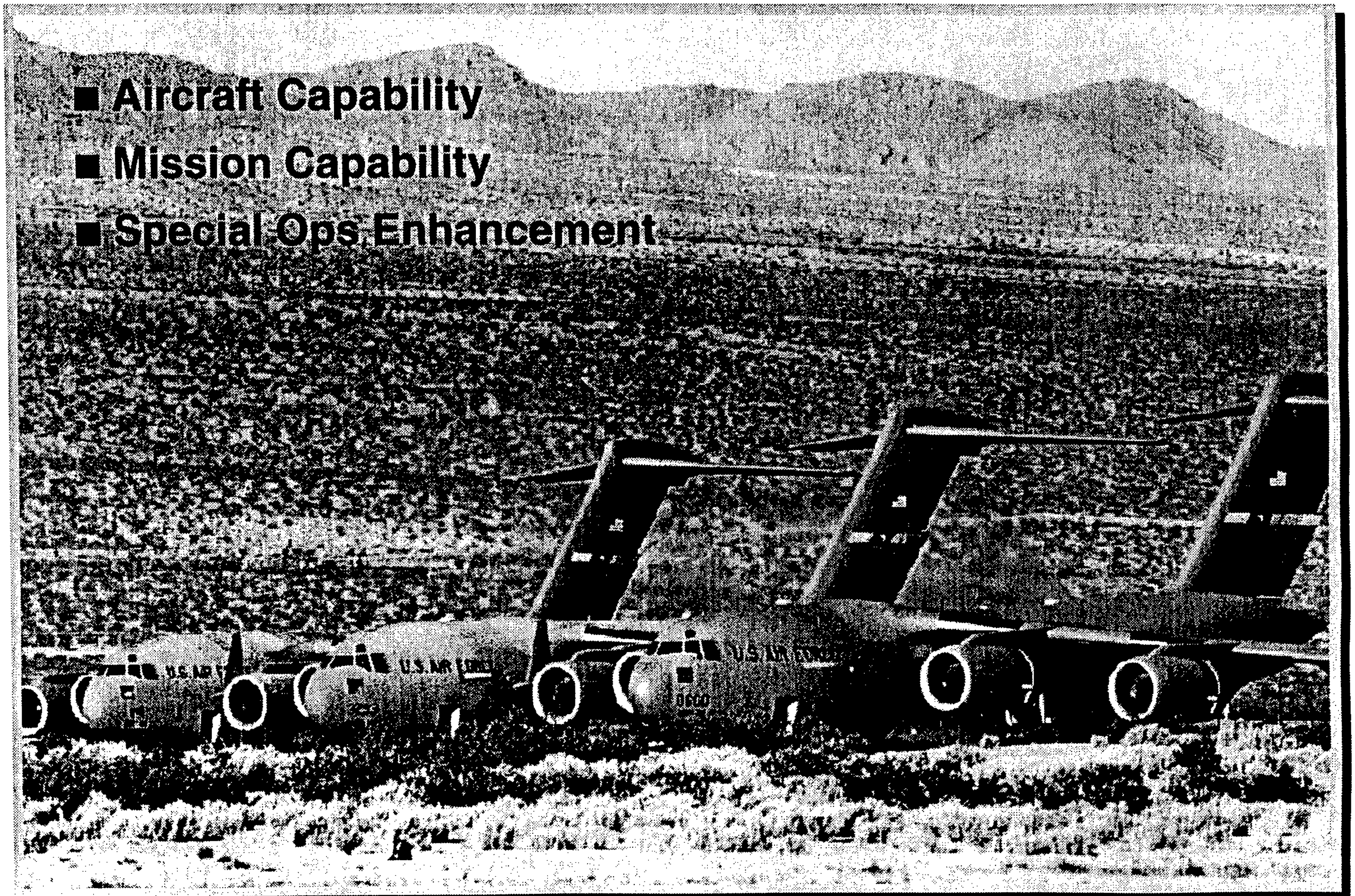
- CV-22 APTLY SUITED FOR USSOCOM
  - SPEED AND RANGE
  - ADVANCED EW SUITE
  - TF/TA RADAR
- REDUCED LOGISTICS TAIL
  - LOWER COST; STILL GET THERE FASTER
  - FEWR AIRCRAFT TO SUPPORT
- SIZE WILL IMPACT OTHER REQUIREMENTS


C-17
THE "NEXT GENERATION"
SPECIAL OPERATIONS
AIRLIFTER
MCDONNELL DOUGLAS

MILITARY TRANSPORT AIRCRAFT

OVERVIEW

MCDONNELL DOUGLAS

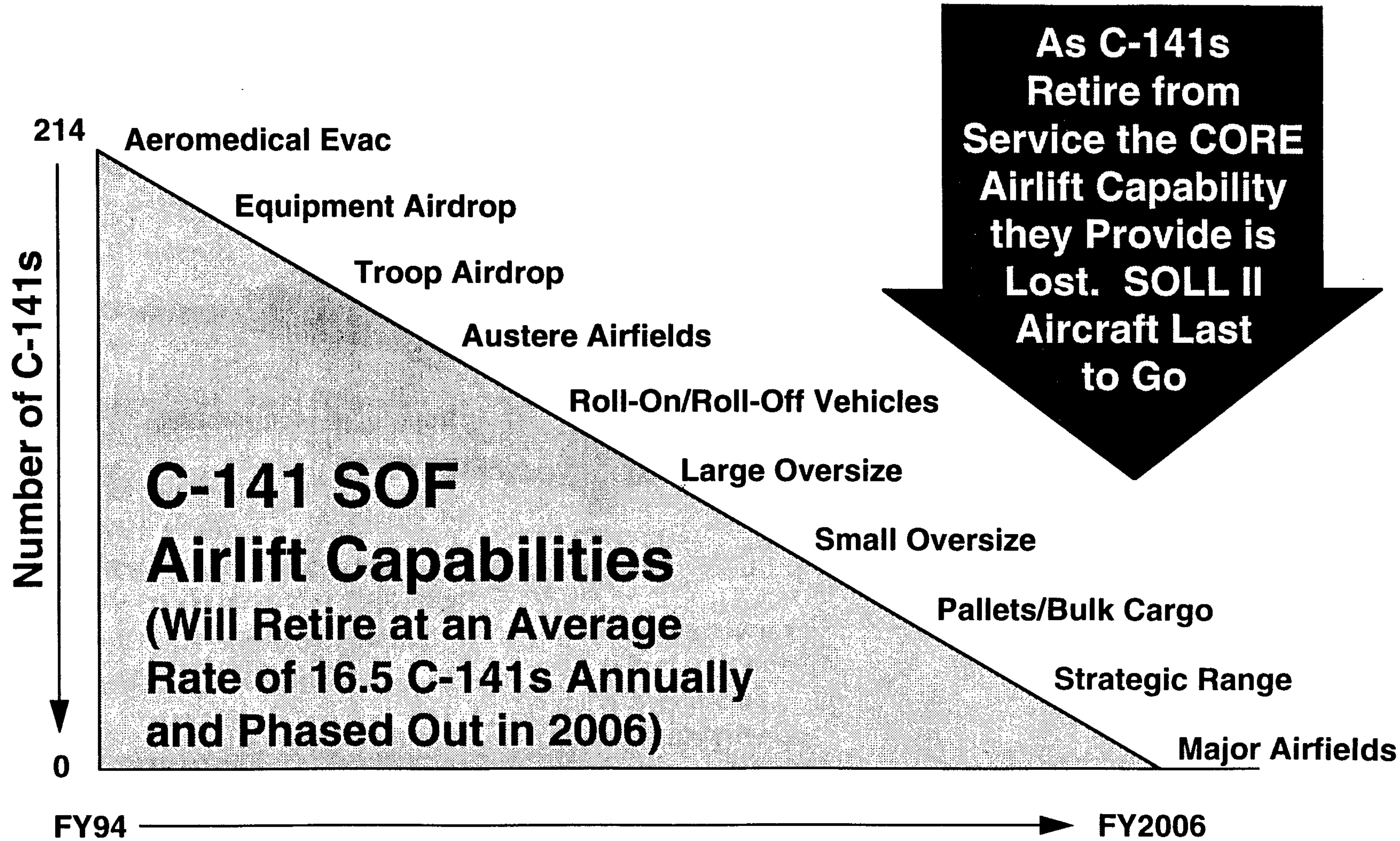


- Aircraft Capability
- Mission Capability
- Special Ops Enhancement

C-141 SOF AIRLIFT CAPABILITY LOST

MILITARY TRANSPORT AIRCRAFT

MCDONNELL DOUGLAS



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MTA
MILITARY TRANSPORT AIRCRAFT

KEY FEATURES

MCDONNELL DOUGLAS

Full-Width Aft Opening
- Straight-in Double-Row Loading
- Outsize Cargo Airdrop/Low Altitude Parachute Extraction System
- Single Aft Door
- Combat Offloading

Paratroop Doors
- Large Opening
- Integral Air Deflector
- Integral Platform

Minimal Maintenance
- Built-in Test
- Maintenance Access

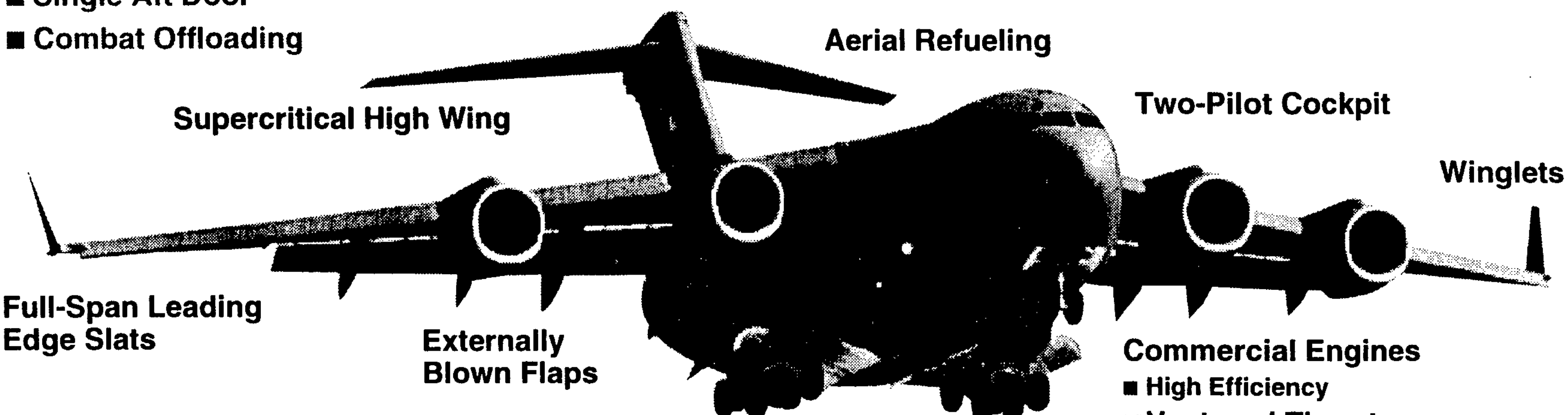
Fly-By-Wire Controls

Aerial Refueling

Supercritical High Wing

Two-Pilot Cockpit

Winglets



Full-Span Leading Edge Slats

Externally Blown Flaps

Commercial Engines
- High Efficiency
- Vectored Thrust-Reversing

High-Sink-Rate Landing Gear

Cargo Floor
- Full-Width Loading (No Treadways)
- Flip-Over Rollers
- Retractable Logistics and Aerial Delivery Rails

Fully Loadable Ramp
- 40,000-lb Capacity
- Integral Ramp Toes

One Loadmaster Operation
- In-Flight Reconfiguration
- Loadmaster Stations Forward and Aft

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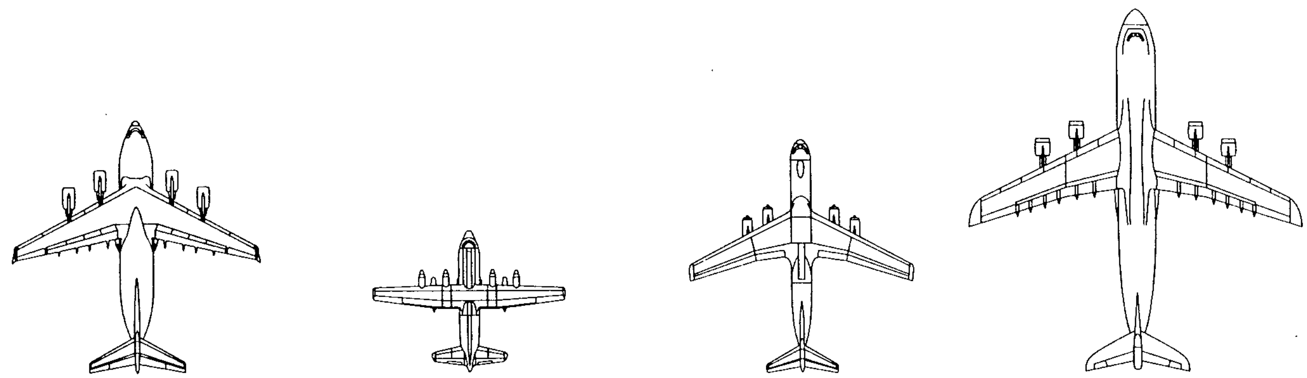
MILITARY TRANSPORT AIRCRAFT

CARGO "BUSINESS END" CAPABILITY

MCDONNELL DOUGLAS



	C-17	C-130	C-141	C-5
Length	68 ft (20.7 m)	41 ft (12.5 m)	93 ft (28.3 m)	121 ft (36.9 m)
Length	88 ft (26.8 m)	52 ft (15.8 m)	104.4 ft (31.8 m)	144.7 ft (44.1 m)
Width	18 ft (5.49 m)	10.1 ft (3.07 m)	10.2 ft (3.12 m)	19 ft (5.79 m)
Height	12.3 ft (3.76 m) [13.5 ft (4.11 m) aft of Wing]	9 ft (2.74 m)	9.1 ft (2.77 m)	13.5 ft (4.11 m) [9.5 ft (2.90 m) at Shoulder]

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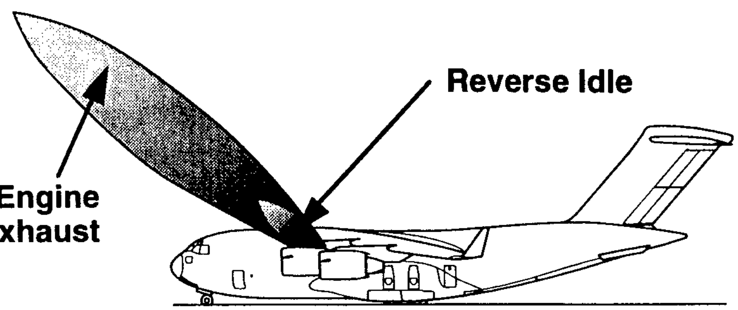
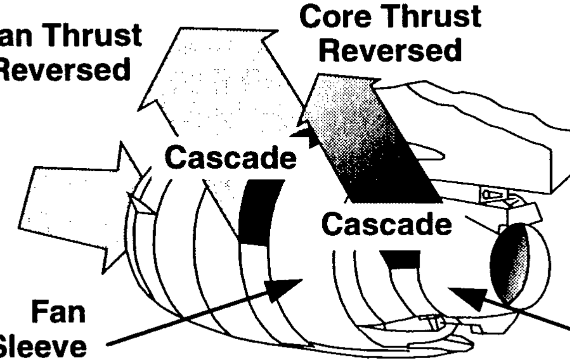
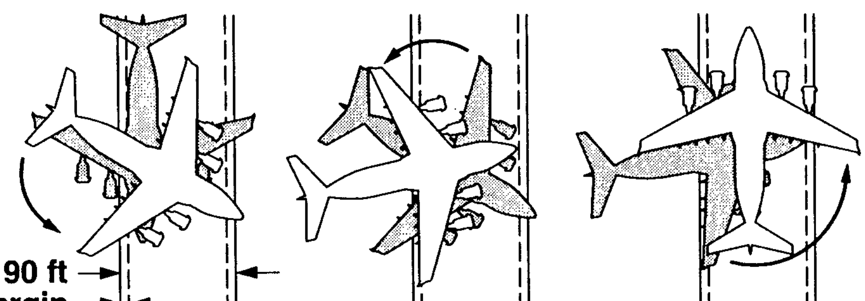
GROUND MANEUVERABILITY TECHNOLOGY

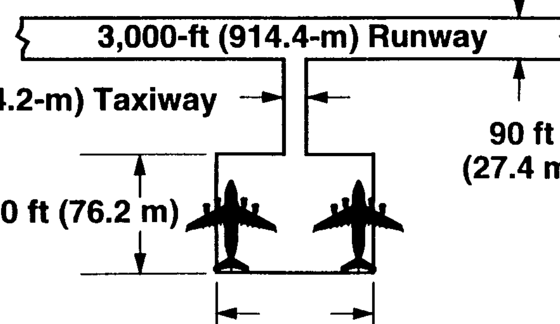
MILITARY TRANSPORT AIRCRAFT

MCDONNELL DOUGLAS









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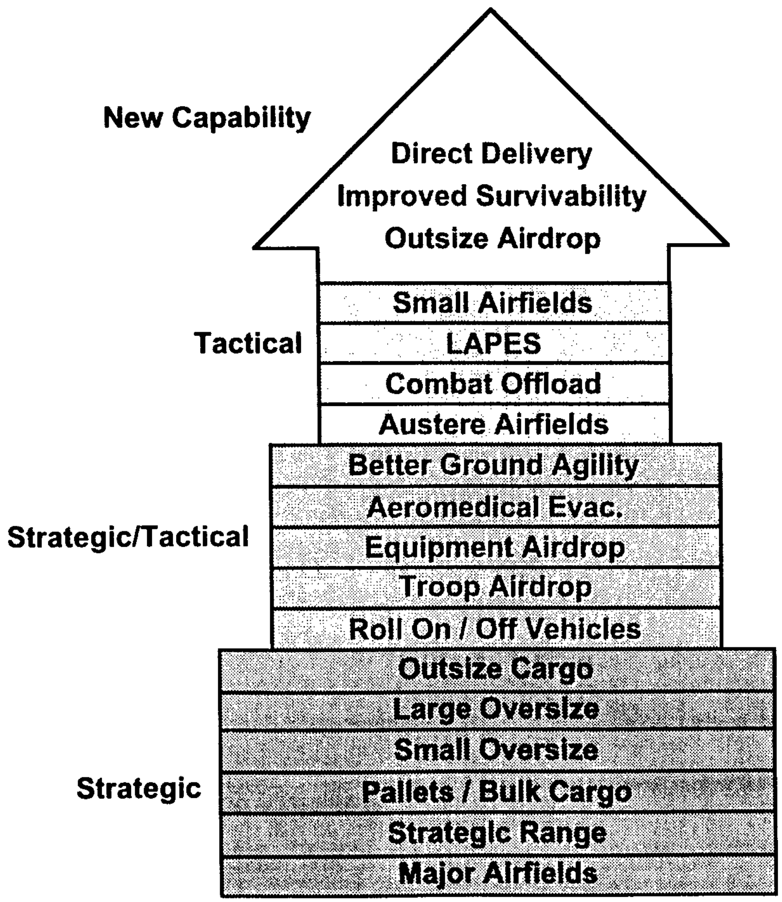
MISSION CAPABILITIES

MISSION CAPABILITY

MILITARY TRANSPORT AIRCRAFT

MCDONNELL DOUGLAS

C-17 Airlift Missions PLUS Special Ops Capabilities



C-17

■ Aerial Delivery System	
● Nine Pallets	
— Sequential Load	110,000 lb
— Single Load	60,000 lb
■ Container Delivery System (CDS)	
● Current Capability	30 Bundles at 2350 lb
● Final Capability	40 Bundles at 2350 lb
■ Paratroops	
● Current Capability	70 Jumpers
● Final Capability	102 Jumpers
■ HALO/HAHO	54 Jumpers
■ Low Altitude Parachute Extraction System (LAPES)	
● Capability	60,000 lb
■ Combat Offload	
● Single Row (11 Pallets)	2 Minutes
● Double Row (18 Pallets – 170,000 lb)	3 Minutes
■ Aeromedical Evacuation	
● Litter Capability	36 Patients
● Ambulatory	54 Patients
■ Troop Seating	
● Permanent Sidewall Seats	54
● Stowed Centerline Seats	48
Total	102

KJP040 Schaffer

SPECIAL OPERATIONS FORCES C-17 LOAD

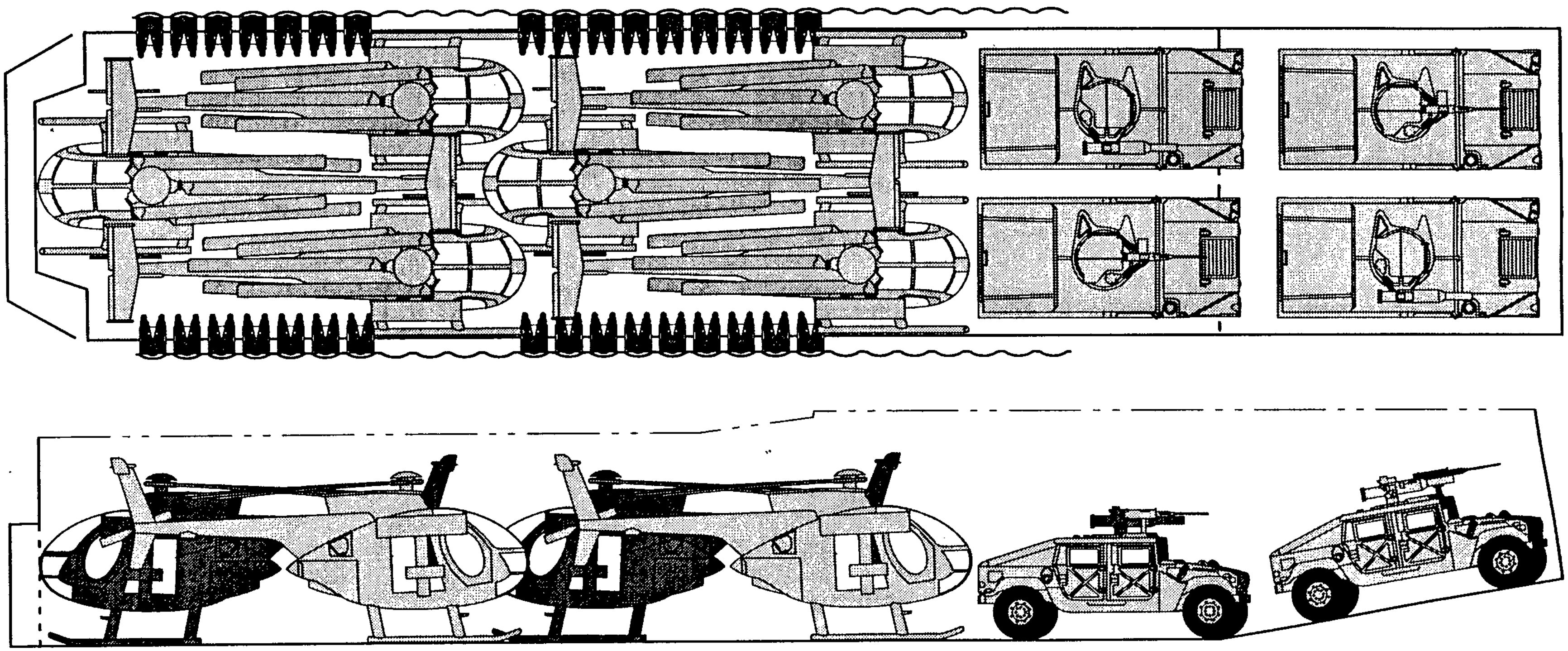
SIX AH-6M HELICOPTERS AND FOUR HMMWVs
PLUS 32 PERSONNEL

MTA

MILITARY TRANSPORT AIRCRAFT

MCDONNELL DOUGLAS

Note: AH-6 weapons pylons folded up and main rotors folded.



Takeoff Distance	**4700 ft**
Landing Distance	**2800 ft**
Range (Unrefueled)	**4400 nm**

Cargo Weight
65,000 lb

KJP040 Schaffer

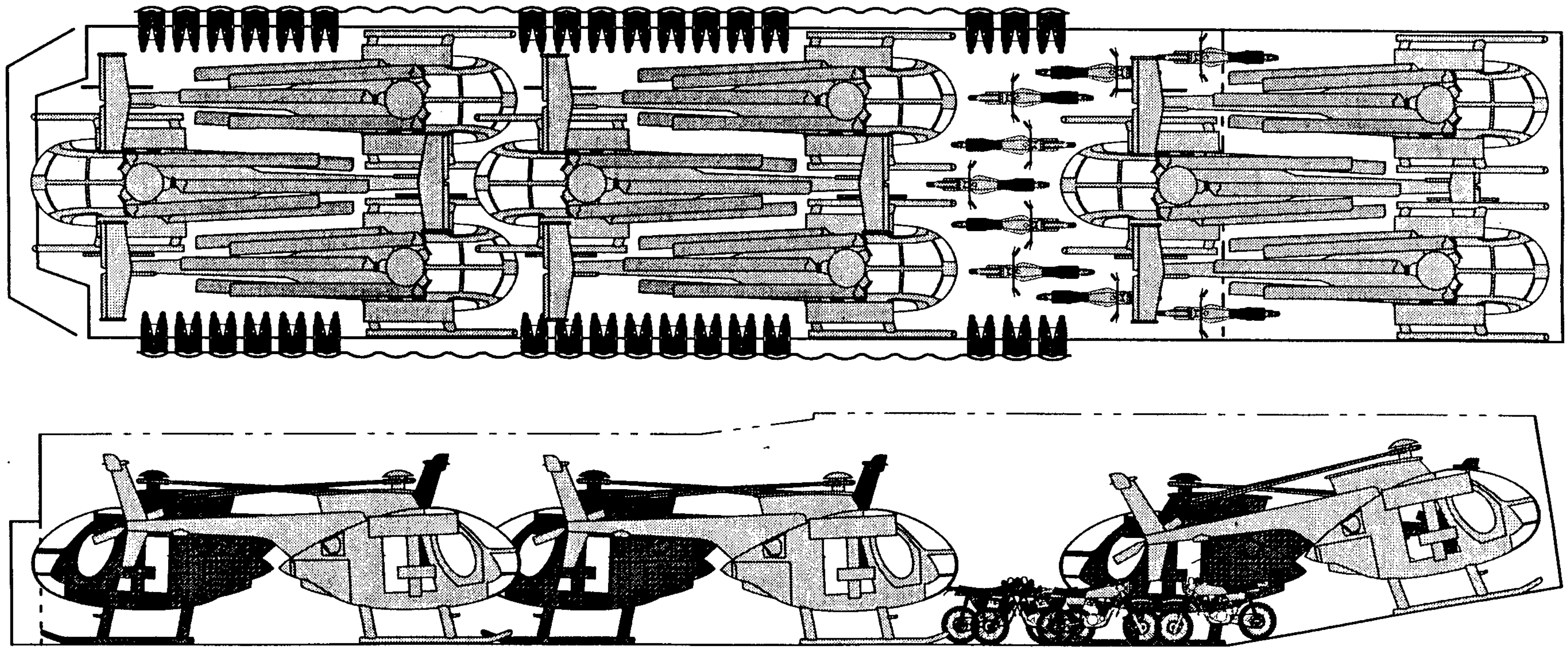
SPECIAL OPERATIONS FORCES C-17 LOAD

NINE AH-6M HELICOPTERS AND NINE OFF-ROAD MOTORCYCLES PLUS 34 PERSONNEL

MTA
MILITARY TRANSPORT AIRCRAFT

MCDONNELL DOUGLAS

Note: AH-6 weapons pylons folded up and main rotors folded.



Takeoff Distance	4300 ft
Landing Distance	2600 ft
Range (Unrefueled)	4600 nm

Cargo Weight
50,000 lb

KJP040 Schaffer

MTA
MILITARY TRANSPORT AIRCRAFT

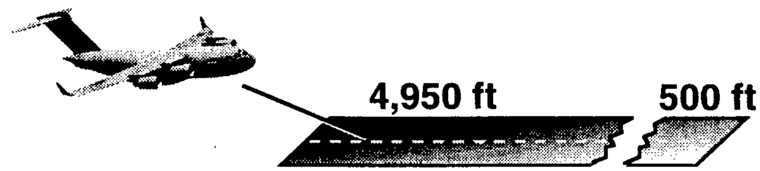
PERFORMANCE COMPARISON

MCDONNELL DOUGLAS

Performance Comparison

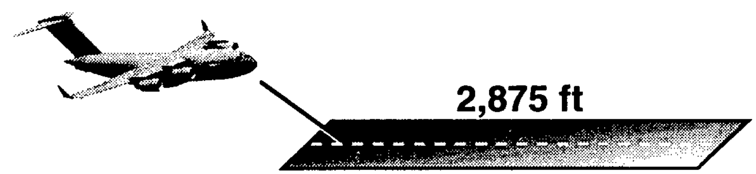
■ **Normal Landing**

● 3° Glide Slope	
● Landing Weight	585,000 lb
● Cargo Load	170,000 lb
● Fuel at Landing	137,000 lb



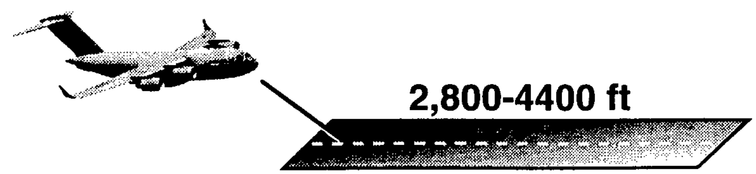
■ **SAAF (Small Austere Airfield)**

● 5° Glide Slope	
● HUD Required	
● Landing Weight	502,000 lb
● Cargo Load*	120,000 lb
● Fuel at Landing*	124,000 lb



■ **Dirt Operations**

● 5° Glide Slope	
● HUD Required	
● Landing Weight	447,000 lb
● Cargo Load	70,000 lb
● Fuel at Landing	99,000 lb



Landing Parameters

- 90°F Landing Temperature
- Dry Runway
- No Wind
- Max Anti Skid Braking
- Idle Reverse

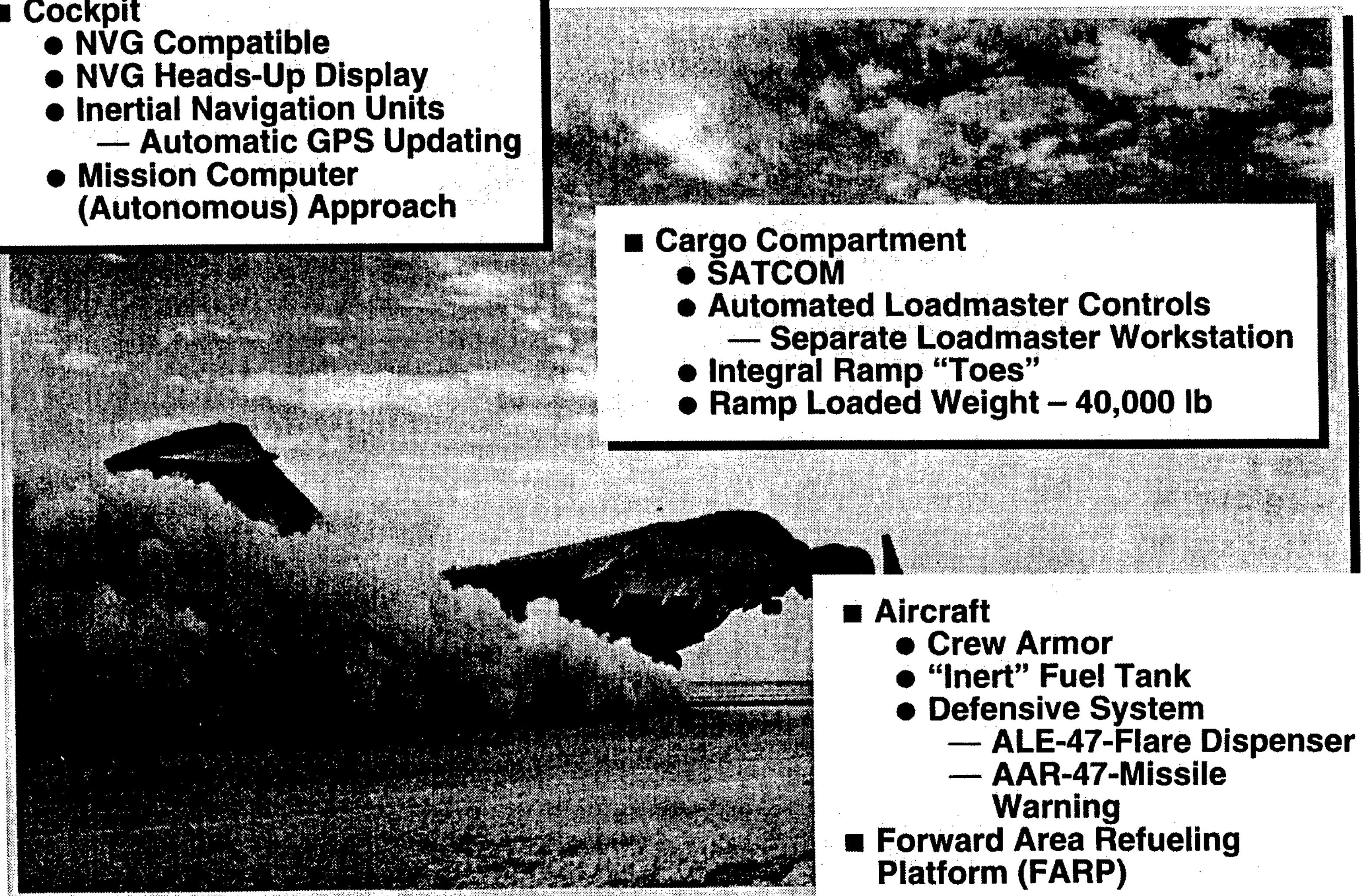
*Fuel/cargo interchangeable up to cargo max of 170,000 lb
**Braking capability

KJP040 Schaffer

SPECIAL OPS ENHANCEMENTS

MTA — MILITARY TRANSPORT AIRCRAFT

MCDONNELL DOUGLAS



- Cockpit
  - NVG Compatible
  - NVG Heads-Up Display
  - Inertial Navigation Units
    - — Automatic GPS Updating
  - Mission Computer (Autonomous) Approach
- Cargo Compartment
  - SATCOM
  - Automated Loadmaster Controls
    - — Separate Loadmaster Workstation
  - Integral Ramp "Toes"
  - Ramp Loaded Weight – 40,000 lb
- Aircraft
  - Crew Armor
  - "Inert" Fuel Tank
  - Defensive System
    - — ALE-47-Flare Dispenser
    - — AAR-47-Missile Warning
- Forward Area Refueling Platform (FARP)

KJP040 Schaffer

MILITARY TRANSPORT AIRCRAFT

SPECIAL OPERATIONS CERTIFICATION MILESTONES

MCDONNELL DOUGLAS

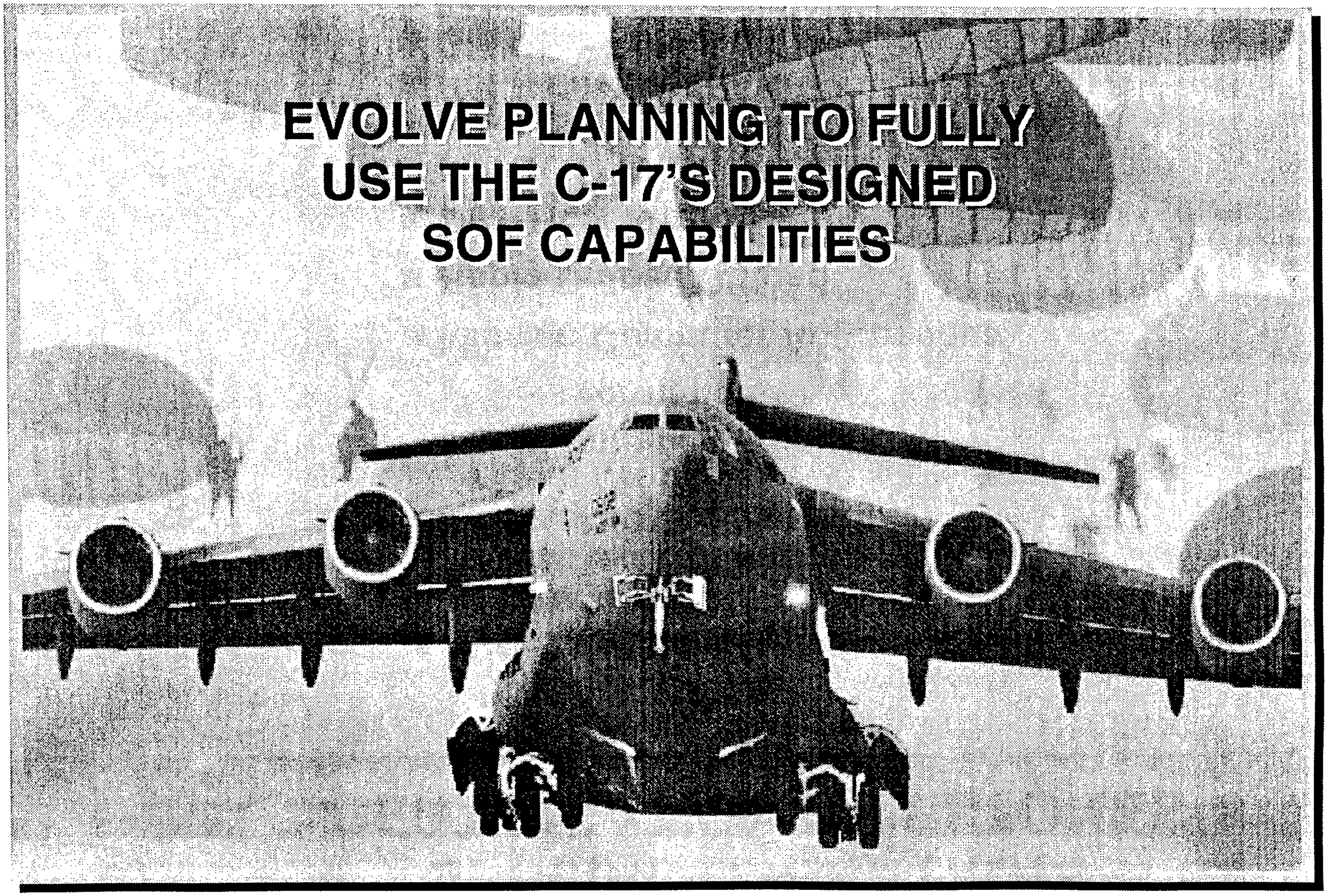
1997

- NVG Operations
  - Low Level
  - Blacked Out Airdrop
  - Blacked Out Landing
  - Boat Drop
    - Single Ship
    - Formation
- Mission Computer Approaches
- Rapid Onload/Offload
- Dual Row Airdrop

1998

- Hot Refueling (FARP)
- Gin Bear Refueling
- Enhanced Communications Requirements
- HALO (35,000 ft)

SUMMARY


EVOLVE PLANNING TO FULLY
USE THE C-17'S DESIGNED
SOF CAPABILITIES

Presentation to

Special Operations / Low Intensity Conflict ADPA Symposium

12 February 1997

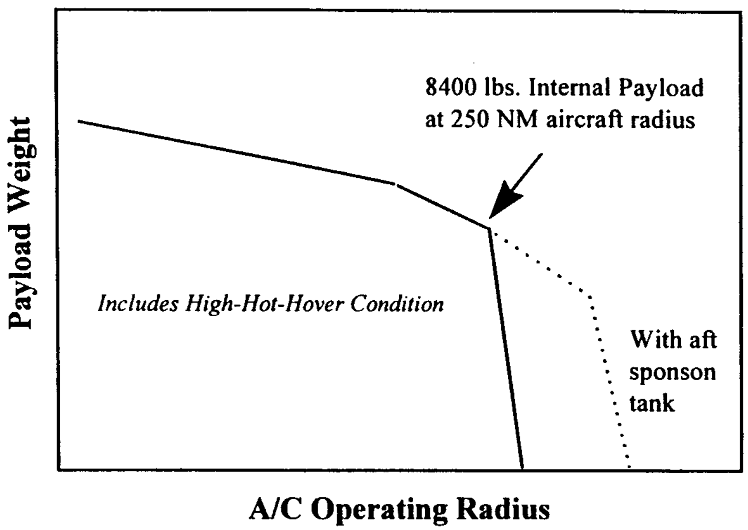
V-22 Transportable Vehicle Programs

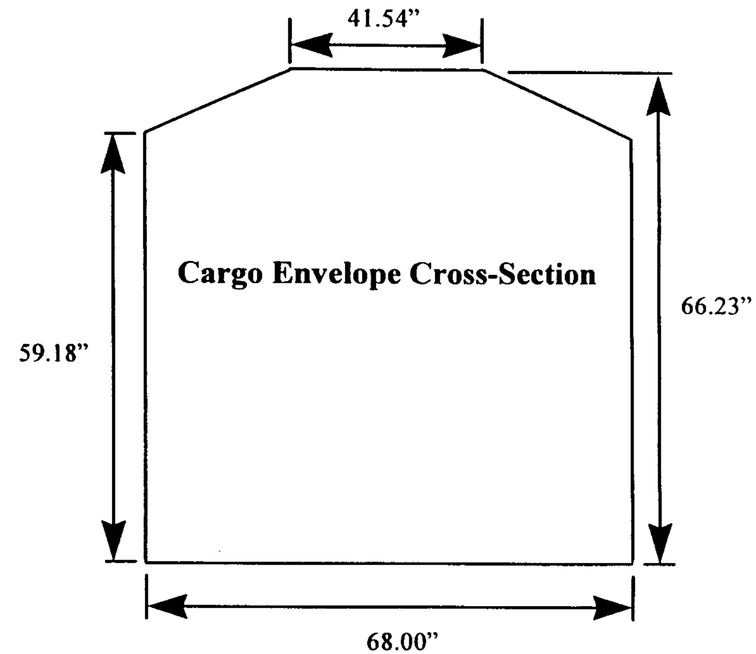
- Requirements / Needs
- Light Strike Vehicle
- Helo-Transportable Multi-Mission Platform
- Joint Tactical Electric Vehicle
- Reconnaissance, Surveillance Targeting Vehicle
- Issues

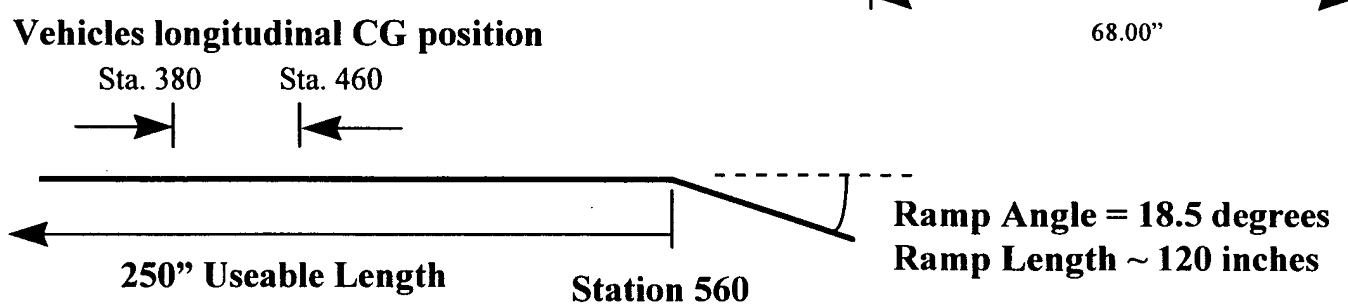
Operational Needs & Drivers

- V-22 Internal Transport
- Rapid ingress and egress from aircraft
- Diesel fueled vehicle
- Multiple mission capability
  - Strike / Weapons
  - Personnel Transport
  - Litter carrier
  - Future capability - C2 / Logistics / Sensors possible
- Affordable to buy and easily maintained
- All Terrain and Environment

V-22 Compatible Ground Vehicle (Internally Transported)







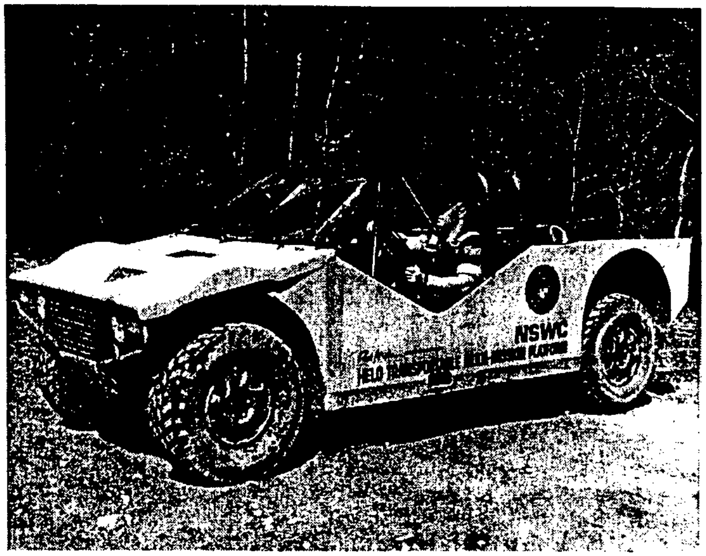
Light Strike Vehicle

Program Manager:

Col. Rich Owen
Marine Corps Systems Command
PM-Ground Weapons

- USMC ORD signed, Joint USMC/SOCOM ORD coming
- Intended to support variety of missions:
  - Support MAGTF (SOC) within deployed MEUs
  - Amphibious Raid mission
  - Reconnaissance role
  - Non-combatant evacuation operations
- Critical requirements:
  - Mobility greater than MAGTF maneuver element
  - V-22 & CH-53 internal transport
  - Crew served weapons
  - 1500# payload/ 3 day mission - USMC
  - 3000# payload/10 day mission - SOCOM
- Current vehicles don't fulfill requirements (HMMWV, M151, Chenowth)
- Requirement for 329 units, IOC in 2001
- Funding decision unknown

Helicopter Transportable Multi-Mission Platform



- Developed as Advanced Technology Demonstrator for LSV in FY91
- Met all requirements, including internal helicopter transport (CH-46 - original spec)
- Automotively tested against HMMWV, Chenowth, & M151
- Trailer developed and tested to compliment vehicle
- Vehicle remains operational

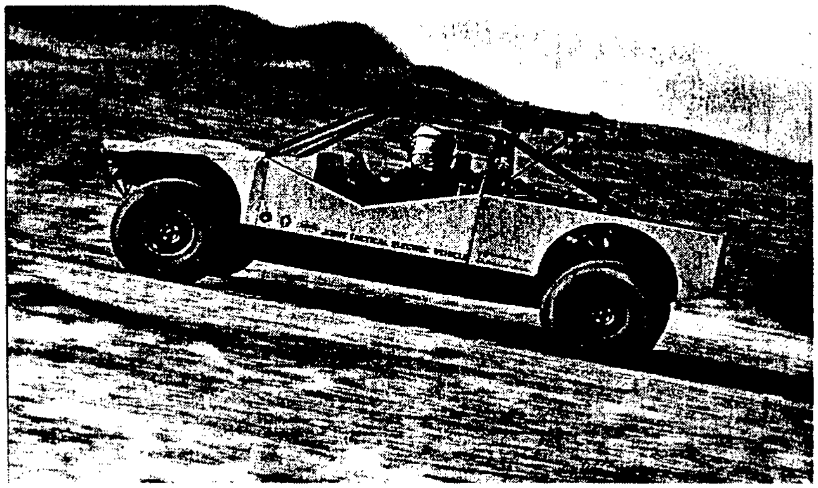
Key characteristics:

- GVW - 5000 lbs (CH-46 limit - original spec)
- Payload - 1600 pounds
- L - 173 in, W- 65 in, H - 62 in
- Range - 400 miles
- Diesel engine
- Ground Clearance - variable 12 to 15 inches
- Maximum speed - 90 mph
- Grade climb - 60% / Side slope - 40%
- Exploited off-road rally racing components

HTMMP Fulfillment of SOCV / LSV Requirements

- Range: 300 Miles (10% paved, 20% improved, 70% unimproved)
- Cross Country Speed: 30 MPH (w/1,000 lbs payload)
- Speed: 60 MPH highway, 0-30 in 6 sec, 0-60 in 15 sec
- RAM-D: 2,000 MMBMF, 0.86 A_a, 0.95 mission, 20,000 mi life
- Payload: 1,500 lbs
- Fording: 20 in, 30 in desired
- Aviation: CH-53 required, CH-46 desired (guns up in 20 sec)
- Engine: Diesel or multifueled, Automatic Transmission
- Human Factors: 5th to 95th percentile male
- Temperature: -25 to 125° F w/o kits
- Crew/Personnel: driver + 2 required, driver + 3 desired
- *Armament: M-2, M-60, MK-19 required, TOW desired (not tested)*

Joint Tactical Electric Vehicle



Key characteristics:

- GVW - 5000 lbs (CH-46 - original spec)
- Payload - 800 pounds with Lead-Acid
  1200 pounds with NiCad
- Maximum speed - 65 mph
- Grade climb - 60% / Side Slope - 60%
- 18 inch wheel travel

- 2nd Generation chassis/lessons learned from HTMMP developed FY94/95
- Hybrid electric drive (diesel & battery)
- Commercial off-the-shelf components
  - Motors from GM IMPACT/EV1
  - Lead-acid batteries
  - Turbo-Diesel/Generator
- Extended range with Diesel/electric drive 445 miles
- Silent operation with all electric - 10 miles (battery limited)

Reconnaissance, Surveillance Targeting Vehicle

Performing Activity: NSWC/CD, DARPA
Related Agencies: SOCOM, ARMY

- **Schedule:**
  - Req'ts/concepting FY97
  - Design FY98
  - Fabrication/Test FY99
  - Integration/Test FY00
  - User Tests/Demos FY01

- **Objective**
  - Demonstrate advanced mobility and survivability technologies for light weight recon/scout vehicles for deployment in V-22 aircraft to support OMFTS, OEO, SOC missions
- **Approach**
  - Determine requirements and develop concepts for accomplishing RSTV goals
  - Close coordination with User community (USMC LSV, SOCOM, Army FSV)
  - Develop technology demonstrator to evaluate operational suitability and performance of mobility and survivability technologies
  - Leverage JTEV Program & DARPA electric vehicle technologies

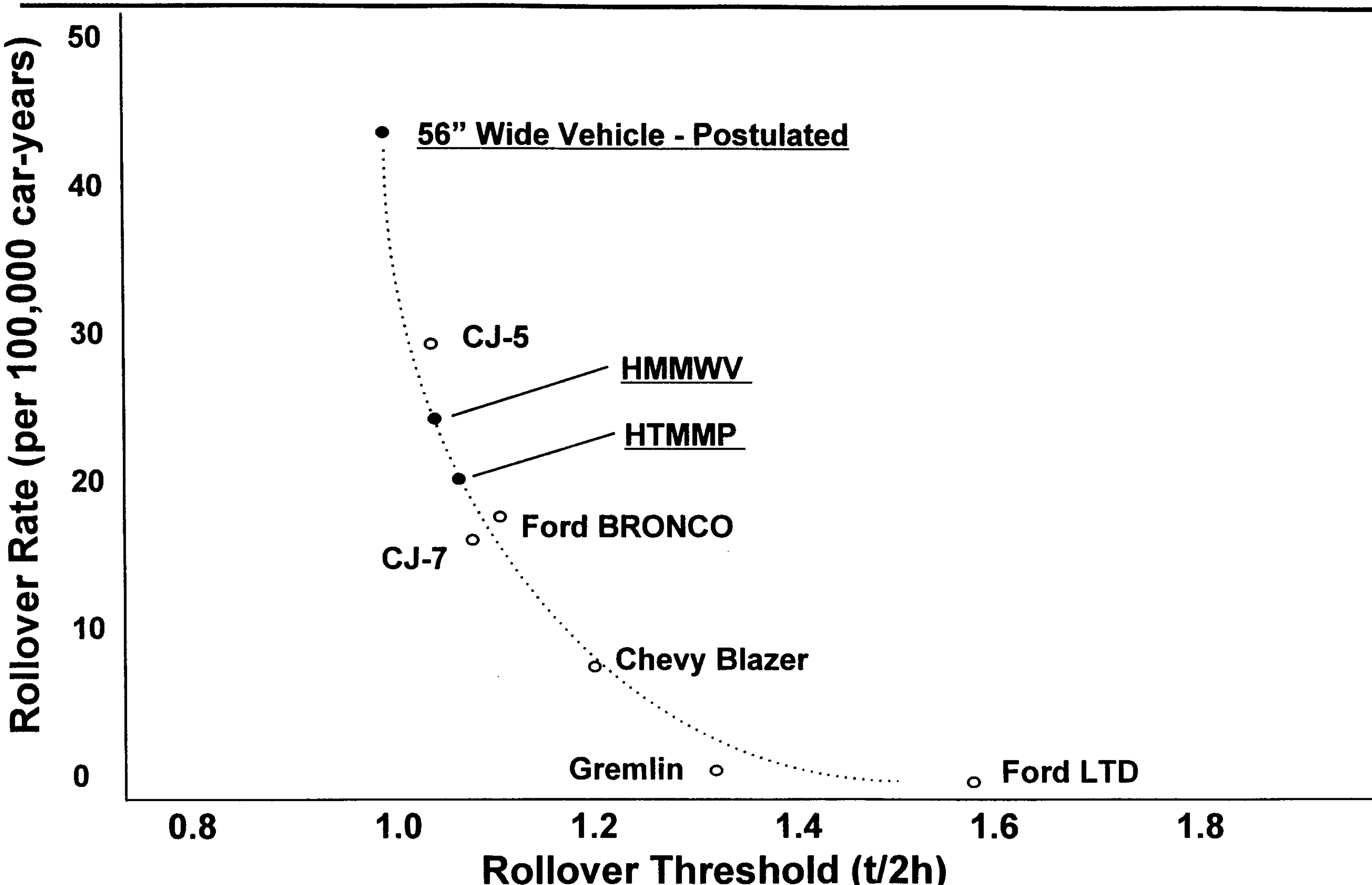
Vehicle Comparison

Characteristic	JTEV Hybrid Electric	HTMMP Mechanical	HMMWV Mechanical	RST -V Hybrid Electric - notional
Gross Vehicle Wt	5700	5000	7700	8000
Payload	1500	1600	2500	3000
Air Transport – Internal	V-22/C-130	V-22/CH-46/C-130	C-130	V-22/C-130
Range	445 mi – engine	400 mi	225 mi	450 mi – engine 10 mi – battery
Highway Fuel Economy	20 mpg	22 mpg	13.8 mpg	20 mpg
Off-Road Fuel Economy	18 mpg	15 mpg	9 mpg	20 mpg
Transmission	Electric No Shift	4-speed Auto with Hi/Lo Differential	3-speed auto with Hi/Lo Differential	Electric with Hi/Lo Differential
Fording depth	36 in.	36 in.	36 in.	30 in. - no prep
Side Slope	60%	40%	40%	40%
Gradeability	60%	60%	60%	60%
Top Hwy Speed	65 mph	90 mph	65 mph	60-75 mph
0-30 mph Accel.	3.8 sec	4.0 sec	5.4 sec	4-6 sec
0-60 mph Accel.	10.0 sec	11.0 sec	19.6 sec	10-15 sec
Ground clearance	10-15 in. variable	12-15 in. variable	16 in.	10-15 in. variable

Issues

- Light Strike Vehicle funding
- Narrow platforms affect stability and payload
- V-22 imposed design loads
  - 16-20 G longitudinal tiedown conditions
  - Aircraft tiedown points (location / quantity)
  - Personnel Seating while inflight
  - Emergency Egress
  - V-22 Crew Chief Movement
  - Sidewall clearance between V-22 & vehicle

V-22 Transportable Vehicles



American Defense Preparedness Association

Special Seminars

Panel 3

C41 In Coalition Operations - Inter-Operability Problems With Joint and Combined Operations?

Moderator: Colonel Albert DePropero, USA (Ret.) ADG

Featured Speakers:

"Special Operations Forces C3I in Operations Other Than War"
Mr. Rick Layton
Evidence Based Research. Inc.

"A New Role for a Strategic Nuclear Asset - C3 Support for SO/LIC and Tactical Operations"
Mr. Charles M. Smith and Dr. John G. Wilson, The Mitre Corporation

"Datum Matching: The Achille's Heel of Advanced Navigation Systems for SOF"
Major John Blitch, USA
USSOCOM (SOJ7-C)

"Advancing SOF C4I Concepts in a Coalition Environment"
Mr. James W. Cluck
USSOCOM (SOAC-C4I)

Special Operations Forces C3I in Operations Other Than War

Richard L. Layton
Evidence Based Research, Inc.
1595 Spring Hill Road, Suite 250
Vienna, Virginia 22182
(703) 893-6800 E-mail: **rlayton@ebrinc.com**

The future Command, Control, Communications and Intelligence (C3I) structure within Special Operations Forces (SOF) will increasingly be challenged by the types of Operations Other Than War (OOTW) that will be assigned to these forces. In eras past we have seen SOF being assigned to Foreign Internal Defense missions, Reconnaissance missions, and a few direct action missions. More recently the missions have involved humanitarian missions in Iraq, Somalia, Haiti, and Bosnia. These missions have become the norm but, changes to the C3I "system" have not kept pace. This discussion will address some of the changes needed to upgrade SOF C3I.

First, it is necessary that we have a common understanding of what OOTW and C3I are, and how the two combine to form a unique system in OOTW. OOTW are tasks assigned to the U.S. military for which warfighting is not the primary purpose. OOTW missions include such tasks as disaster relief, humanitarian assistance, environmental catastrophe response, and use of machines to monitor situations and are generally carried out in non-threatening environments. OOTW also include operations in which military forces supplement law enforcement in relatively low-threat environments such as counter-drug efforts and restoration of civil order. These tasks are executed in areas where the threat is real but combat is not sought, such as shows of force, unopposed evacuation, freedom of navigation operations, peace monitoring, or combating terrorism. Operations are under military threat where combat is a clear possibility or near certainty, such as peace enforcement, peace imposition, opposed evacuation, retaliatory actions, or premptive raids. OOTW are almost always political-military missions and increasingly, OOTW is a coalition activity. Military C3I leads and manages forces and systems, but has a larger structure.

C3I in OOTW is a complex web of command arrangements which surrounds and cuts across the military C3I. In most cases the U.S. Ambassador leads the "country team." Some U.S. assets SOF and intelligence are linked to, but not integrated into coalition C3I systems. Non-defense agencies coordinate with the military forces, but do not accept military directives. Coalition forces have differing national agendas and maintain independent communications and command arrangements with their governments, or through a senior national liaison officer. International organizations, NGOs/PVOs may have important information, provide important services related to mission accomplishment, and need/expect support from military forces but will not accept military directives. Traditional leaders of the country or area will play an important role in providing information to the citizens. And finally, the conflict participants will cooperate with or resist military directives based on complex, often dynamic relationships.

The keys to understanding C3I in OOTW begins with an understanding that the present command arrangements and the formal C3I system will not follow current or established doctrine. U.S. doctrine uses simple hierarchies in command arrangements, although in coalitions national sovereignty must be recognized. In practice, however, very different structures predominate. Span of control often exceeds reasonable guidelines. The strategic, operational, and tactical levels often become intermingled. Operational decision making in OOTW will likely be slower than in combat like Major Regional Conflicts, decision making is more complex and will be decentralized among a variety of participants. The horizons of C3I decisions will have national implications. The support requirements for OOTW extend far beyond the military into the political arena. Adaptive control becomes the limit of planning quality in most OOTW, but reactive decision making will dominate unless contingency planning is adopted.

Decision making in OOTW is complex. Simple decisions are those that involve selecting options from a preset menu. Examples include sensor-to-shooter systems, planning for lift, and logistics support. Simple decisions can be reduced to algorithms or rule-based systems. Complex decisions are those for which options must be created before a selection is possible. Examples include course of action analysis above the tactical level and most SOF operations. Complex decisions typically have no rule-based solutions and involve strategies such as "satificing" or "mini-max." In well understood military knowledge domains (e.g. air-to-air engagements), complex decisions are often converted to simple ones through the use of doctrine, procedures, approved tactics, or "recognition-primed decision making." OOTW situations, because of the dynamic situations, the number of relevant actors, and the predominance of political over military factors, are dominated by complex decisions. In reality complex decisions are required at junior military levels. The basic elements of military practice, such as rules of engagement, self protections, and the principles of war (e.g., surprise, security, and mass) become complex. As a result, the consequences of poor decision making are unpredictable because they have potentially "chaotic" social and political consequences.

OOTW are qualitatively different from warfighting operations. SOF C3I in OOTW is also different from warfighting operations. Decision support must extend beyond military issues that will impact or constrain military activities. Decision making will be more decentralized for SOF in OOTW. The variety of actors involved will impact on military operations. The fact that not all decisions are taken in the theater will have a local impact and cause many changes to operational and tactical stratergies. International mandates or negotiations may limit military activities in the area of operations, as will the fact that foreign coalition forces and agencies will want to consult with home or a senior national liaison officer, as to their actions in the field.

In OOTW situations decision making-cycles will be slower than in warfighting C3I. OOTW and SOF operations tend to occur in poorly understood situations: unfamiliar geography, little studied adversaries, and with some novel coalition partners. All of the above factors increase decision complexity. The more complex decisions require more

time if the risk is to be minimized. And the likely adversary courses of action and reactions to our actions will slow decision making. It is likely that in some OOTW operations involving peace operations and humanitarian efforts, knowing how an adversary will react is more important than surprise on our part. Finally, in the use of coalition forces, communications among partners will require time.

In these SOF operations C3I requires decision support in related arenas of planning aids and mission rehearsal, intelligence, weather and logistics planning, scheduling, and tracking. These situations also require tools that assist with other key elements of this unfamiliar, dynamic environment that deal with political situations, population movements (refugees), activities of non-military organizations and entities, and demand for resources (communications, lift, security) from outside the military.

The use of adaptive control through timely contingency planning is the appropriate goal for decision making in OOTW. Military commanders can control situations at five different levels in OOTW: reflexive control, adaptive control, direct control, reactive control, and trial and error.

- In reflexive control the situation is fully understood and the best course of action (which takes advantage of the situation and the actions of the adversaries) is clearly identified and executed successfully.

- In adaptive control, the situation is again well understood with a small number (3-7) of possible futures for which lead indicators are available. Contingency plans and time to implement them exist, so the situation can be controlled, unacceptable outcomes can be avoided, and successful mission accomplishment is likely over time.

- Direct control involves a general understanding of the situation and how it can become dangerous. Options exist that can prevent unacceptable outcomes, but the circumstances under which mission accomplishment should be expected are not clear.

- Reactive control is a situation where alternative futures are known, but no lead time indicators exist. Hence, adversaries have the initiative or circumstances beyond the control of the command, and the command must respond after the fact.

- In trial and error, the current situation is unacceptable. The command must act, but the situation is poorly understood, so the results of the actions chosen cannot be forecast with confidence.

Unless contingency planning is adopted, reactive control is likely to dominate. There is too much complexity in OOTW and SOF operations to be successful with reflexive control, and direct control is too uncertain for coalitions to accept.

In summary, OOTW tasks are qualitatively different from warfighting operations because they are fundamentally different missions or have purposes dominated by political issues.

They occur in dynamic, complex environments and often involve novel partners, unfamiliar terrain, and little studied adversaries. Because of these qualitative differences, C3I in OOTW and SOF operations is profoundly different than in warfighting operations. The decision making is complex, the embedded command arrangements are more complex than the C3I process itself, and the C3I process is characterized by slow, decentralized, risk-averse decision cycles.

The decision support in OOTW must extend beyond military issues to include other domains that constrain or are impacted by military activities. Adaptive control through timely contingency planning is the appropriate goal for decision making in OOTW and SOF operations. Reflexive control is dangerous in these situations, and direct control will be rejected by coalitions. Unless contingency planning is adopted, reactive control will predominate. By upgrading SOF C3I to allow for these unique characteristics, SOF can better prepare for the unique military challenges ahead.

Advancing SOF C4I Concepts in a Coalition Environment

Mr. James W. Cluck, Program Manager, C4I Automation Systems

United States Special Operations Command
7701 Tampa Point Boulevard
MacDill AFB, FL 33621-5323

January 1997

The United States Special Operations Command (USSOCOM) is developing a program migration plan for Special Operating Force (SOF) C4I systems to specifically enhance the performance of intelligence and operational functions in the Joint Special Operations Task Force (JSOTF) environment. By taking advantage of recent technology advances in practical multi-level security applications, crisis action tools and web browser/servers, an unprecedented exchange of information will be possible among conventional, special operations and coalition forces.

Additionally, USSOCOM and the United States Atlantic Command (USACOM), are proposing an FY98 Advanced Concept Technology Demonstration (ACTD) linking discrete C4I programs into an integrated network permitting the rapid access, retrieval, processing and dissemination of all relevant information to maintain a consistent picture of the crisis/operation. The resulting network will provide all analyst and operator support tools, network peripherals, mass storage units and communications interfaces for operation at both collateral and special compartmented information levels. Data exchange with operational units and platforms will occur through asynchronous transfer mode (ATM) switches and asymmetrical routing schemes integrating narrowband links with wideband broadcast services.

Within the scope of currently approved requirements, the USSOCOM Program Executive Officer, C4I (PEO-C4I) Systems is coordinating the migration of separate C4I programs into a mutually integrated acquisition strategy. PEO-C4I is pursuing this objective through a natural blend of current programs (SOF Intelligence Vehicle, Integrated Survey Program, Town Crier and the Secure Survivable Communications Network II) as well as sponsored technology initiatives within the Navy Command, Control and Ocean Surveillance Center Research and Development Activity (NRaD) and the Defense Advanced Research Projects Agency (DARPA). The resultant architecture is depicted in Figure 1.

- SOF Intelligence Vehicle (SOF IV). The SOF IV was originally developed to extend intelligence data handling system capabilities to the tactical level. It is currently being fielded to all USSOCOM Component and Theater Special Operations Commands. When deployed, it will provide interoperability with theater, regional and national databases as well as provide for receipt of near real-time intelligence broadcasts through use of the Multi-mission Advanced Tactical Terminal and the SOF Imagery Receiver Intelligence System. The SOF IV has also been tested with multi-level security (MLS)

equipment to permit dual network operations at both secret and special compartmented intelligence security levels. From a testing perspective, the SOF IV will serve as a tactical automation platform from which to host the technology initiatives necessary to evaluate the proposed C4I coalition objectives. This offers a low cost solution to integration testing and allows the transfer of successful techniques to ongoing programs affecting all USSOCOM automated garrison networks, intelligence data handling systems, and tactical communication systems as well as supporting evolutionary technology insertions into the life cycle of the SOF IV

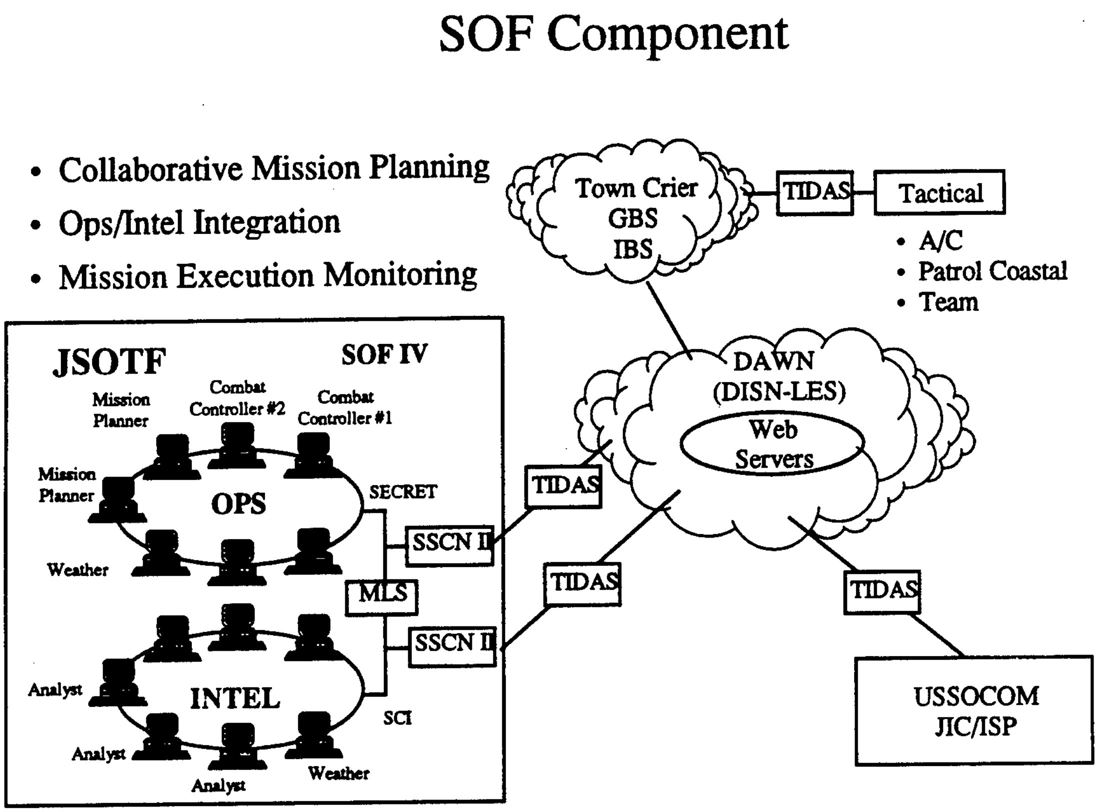


Figure 1.

• Integrated Survey Program (ISP). The ISP is responsible for the production of target data packages needed for mission planning. It merges and standardizes four existing programs: Regional Survey Teams, Surrogate Travel Program, Interagency Survey Team, and the Maritime Operational Support Program. The ISP has created a centralized production element as part of the USSOCOM Joint Intelligence Center. Products will be disseminated and available to mission planners worldwide.

• Town Crier. Town Crier is a joint USSOCOM and Navy Tactical Exploitation of National Capabilities project to address the rapid dissemination of SOF generated perishable surveillance and reconnaissance products to weapon platforms via national intelligence dissemination systems. Specifically, Town Crier is the middleware which allows SOF targeting data to be injected directly into existing broadcast systems.

• Secure Survivable Communications Network (SSCN) II. SSCN II is an ongoing evaluation to integrate and test the tactical application of ATM technologies to SOF command and control systems. USSOCOM, U.S. Central Command and Rome Labs are collaborating with industry to evaluate commercial products on a test network.

A significant contribution to resolving system interoperability challenges is being provided by NRaD through a project known as SOF Tactical Data Processor (TDP). Despite its name, the SOF TDP is not focused on the development of a new tactical data processor for SOF, but rather it focuses on applying commercial object request broker architecture technology to existing military applications. The objective of SOF TDP is to provide an underlying interoperable, scaleable, "plug and play" software architecture. USSOCOM anticipates an immediate return on investment as specific software modules become platform independent and rapidly interchangeable thereby significantly reducing the cost of achieving lateral interoperability among C4I systems.

With an initial C4I tactical foundation established through these previously discussed initiatives, USSOCOM expects to overlay a series of emerging DARPA technologies to automate the SOF crisis mission planning, execution and monitoring process. Collectively known as SPINNAKER, these projects will provide dispersed SOF crisis action teams with the tools to collaboratively plan and execute operational tasks that previously have been manually intensive and time consuming. Moreover, SPINNAKER will provide crisis action teams with tools that permit synchronized, event-based planning along with modeling and 3-D scene visualization.

USSOCOM is developing an iterative test and release process to assure that expected operational objectives are achieved in a timely and cost effective manner. Accordingly, as products are released from developmental testing within the Advanced High Performance Computing Activity at DARPA they will be integrated into an operational test network within a Special Operations Test Site. From that site, special operators will simulate crisis action tasks and verify the mission performance capabilities of each application. Once functionality has been confirmed, performance will be validated through interoperability testing with the JCS chartered Joint C4ISR Battle Center (JBC) at Suffolk, VA and SOF unique systems through a series of field exercises.

Coincident with this activity, USSOCOM and USACOM will be coordinating the integration of practical multi-level security tools that will facilitate the exchange of information between SOF and conventional forces. Figure 2 reflects a notional topology that incorporates multi-level security features along with advanced communications techniques facilitating interoperability among joint participants. Products such as standard mail guards, firewalls andfortezza encryption techniques will assist data exchange while preserving security integrity and authorized accesses. An emerging technology known as the trusted intelink dissemination and access server (TIDAS) will permit users to access a common web server and view or retrieve all information at their registered security level and below.

The culmination of these cooperative efforts is being crafted into an advanced concept technology demonstration (ACTD) proposed by USSOCOM and USACOM for

C4I Coalition ACTD

Demonstrate Seamless Logistics, Intel and Operations Information Flow throughout C4I Spectrum

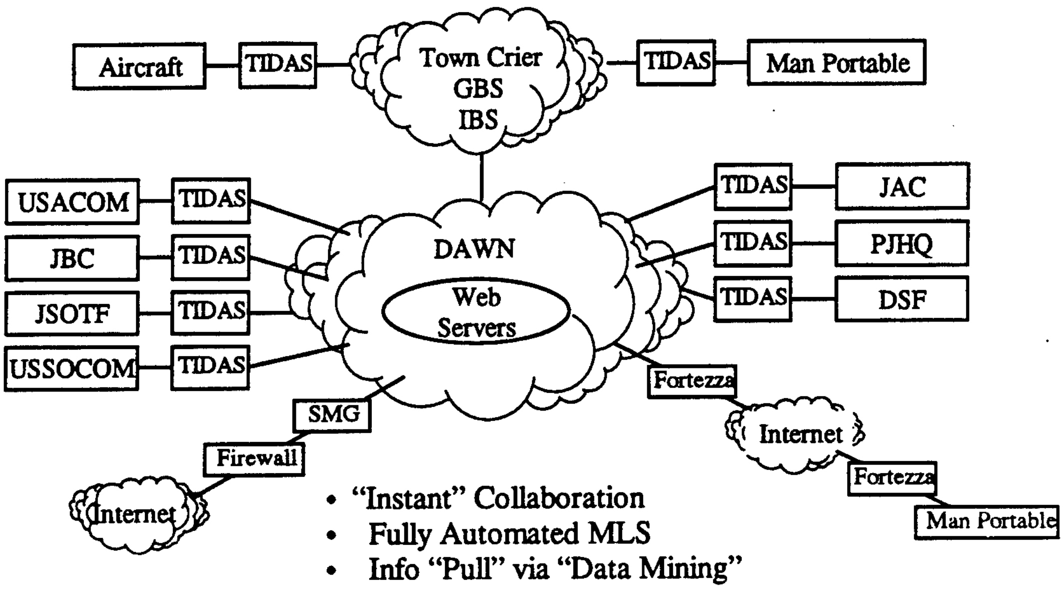


Figure 2.

initiation during FY98. The ACTD will validate that a central database of information can be effectively accessed and data exchanged by conventional, coalition and special operations forces in execution of a joint operation. The demonstration is being supported by Britain's Permanent Joint Headquarters (PJHQ) through formal agreements currently being established. The PJHQ was established within the last year and serves as the United Kingdom's Force Provider thereby fulfilling a role similar to that of USACOM and USSOCOM. Active involvement by British forces using comparable C4I systems will significantly enhance the operational relevance of the ACTD and confirm joint interoperability expectations of the technology initiatives. The ACTD will test and measure the levels of effectiveness of the proposed network and assess its benefit to future joint or combined operations. Consistent with ACTD principles, and recent designation of the ACTD concept as a key element within the acquisition process, resultant technology benefits from the demonstration will be directly transferred to SOF units and ongoing programs.

Clearly, future SOF operations will involve both multi-national and conventional forces. Through careful migration planning among current programs, along with the joint

development and test strategies as described herein, USSOCOM is aggressively pursuing acquisition solutions that will assure SOF remains interoperable with operational partners.

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DATUM MATCHING: THE ACHILLES' HEEL OF ADVANCED NAVIGATION SYSTEMS FOR SOF

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ABSTRACT

Special Operations, by their very nature, consistently depend on precise localization procedures to ensure the highest chance of mission success. Inaccurate intelligence products, targeting information and position reporting not only degrade the chance of high profile mission success, they also pose a direct threat to the lives and welfare of Special Operations Forces (SOF) in action world wide. The development of advanced navigation aids such as the Global Positioning System (GPS) has often been looked upon as the definitive answer to SOF's accuracy requirements. Since the advent of GPS in the late 1980s, however, a significant number of incidents involving datum mismatch errors throughout the U.S. military (with displacement errors in excess of 700 meters) has raised increasing concern with respect to overall system accuracy and operational effectiveness.

This paper (which is an edited re-print from an on-file report to the Army Space Institute by the same author) describes the datum mismatch problem in detail using illustrative examples and graphics. Compensation and proposed remediation methods are then described in the context of theater wide operations and corrective measures. This is followed by a discussion of why such measures are often inadequate to support worldwide Special Operations objectives, especially in coalition support activities. It then proposes a modification to current Tactics, Techniques, and Procedures (TTP) to deal with this problem effectively. The conclusion drawn from historical reference, case studies and personal experience is that the entire DOD community needs to develop a much higher level of awareness for the datum mismatch problem and respond to the proposed publication revisions as soon as possible. Such action is necessary to avoid further risk to mission accomplishment and overall welfare of SOF worldwide.

INTRODUCTION

The extensive proliferation of advanced navigation systems which has occurred within the last two decades has had a profound impact on the ability of ground units to conduct efficient and complex maneuver activities in a variety of challenging terrain and weather profiles. This being true, then how can a SOF team commander exit from GPS - equipped delivery platform (helicopter, boat, etc.) and find himself 800 meters away from the 10 digit coordinate of an LZ which was well coordinated during pre-mission planning?

The answer lies in a relatively simple, yet extremely significant concept called datum matching.

Anyone who has been frustrated by attempts to match grid lines with terrain features on adjoining 1:50,000 map sheets may have been a victim of datum mismatch effects (although the majority of such problems are caused by spheroid inaccuracies involved with trying to represent the rounded earth's surface on a flat piece of paper) . Datum matching is a process by which survey measurement references from different products are aligned to compensate for coordinate overlay offsets in pursuit of optimum accuracy for positional plots.

DATUM MISMATCH DEFINED

The repercussions of ignoring the alignment process indicated above can be enormous. If a map coordinate based on a South American 56 Datum for example, is applied to a map of the same area with a WGS 84 datum, the plot is inherently offset with an error of 288 meters (easting) by 175 meters (northing) by 375 meters (altitude) as indicated in Enclosure 1. This offset is not the result of sloppy survey effects, photo interpretation factors, or other sources of typical human error with regard to terrain orientation. Rather, it simply involves a rather subtle but potentially significant shift in the ground zero representation (e.g. reference datum) of whichever ellipsoid and coordinate overlay system (UTM, Latitude/Longitude, MGRS, etc.) has been chosen to produce the particular map product in question.

These datum offset errors result from the use of different models and survey techniques between two or more map products covering the same area of interest. For example, the original survey agency which produced a 1:50,000 map of Bogota Columbia used different (and potentially less precise) start points, reference transfer points, and/or survey procedures to produce its map than a U.S. mapmaker interested in the same area (in this case the U.S. based National Imagery and Mapping Agency (NIMA), formerly the Defense Mapping Agency: DMA) as indicated in enclosure 3. Notice that the underlined marginal information reflects that different datums were used to produce the two map products covering the same area. When the corresponding coordinate systems are transposed, the offset error indicated above can be seen as the horizontal displacement between grid line overlays.

A common misconception that exists within many ground units, however, is that use of latitude and longitude transfers will solve the problem. As enclosure 3 indicates, latitude and longitude overlays are subject to the same datum mismatch offset because they simply conform to another coordinate system which is based on the same basic survey process. Also notice that the marginal data indicates a difference in vertical datum references as well. Hence, even as we compensate for the northing (latitude) and easting (longitude) differences indicated above, our map plots may still incur altitude errors as well. Thus, the datum mismatch problem is particularly troublesome because it transcends virtually

any coordinate system in both horizontal (e.g. position) and vertical (e.g. altitude) directions.

PROBLEM RECOGNITION

The datum mismatch problem has only been exposed as a significant military problem within the last decade. One obvious reason for this is the proliferation of navigation gadgets mentioned above did not become significant until relatively recently. But the U.S. military has their hands on such systems for quite some time. Why hasn't this problem been recognized within military units? An effective answer requires some historical perspective.

Motivation for the development for most advanced navigation aids (NavAids) came primarily from the requirement to conduct long range movements at sea, in the air, or even in Low Earth Orbit. The fact that many of these systems (Omega, Loran, Transit, etc.) only provided accuracy within hundreds of meters was of little concern to pilots and navigators conducting long range (hundreds of miles) missions [1]. At such ranges (and high speeds for aircraft) a 1/4 - 1/2 mile error radius was perfectly acceptable. Besides, whenever a precision navigation activity was required (e.g. docking a ship or landing an aircraft), some other means of visual recognition was always available for specific reference and localization. As night operations and all-weather capabilities received more interest in military operations, however, this visual recognition "crutch" was increasingly discarded: especially in situations requiring high threat interdiction missions, Close Air Support (CAS), or infiltration of Special Operations Forces (SOF). Hence the R&D community strove to develop more effective NavAids such as GPS [1].

One would think, then, that upon initial testing of GPS systems in the late 1980's the datum reference problem would be recognized. Well, to a certain extent it was. Even the early Rockwell systems had a datum matching / transfer capability which was mentioned in each of their operators' manuals (although description of the datum matching concept was sorely lacking). Operator sensitivity to the datum matching requirement never fully developed for several reasons.

The first factor basically boils down to concept familiarization. As the typical operator struggled to learn the intricacies of this "high tech" space based navigation system, he necessarily focused on just getting the thing working enough to spit out some sort of grid coordinate. Even if a dedicated test operator fooled around with the datum transfer features of the system, he would only notice a difference in co-ordinate localization if he painstakingly cycled through different datums while remaining totally static and trouble free (e.g. full ephemeris data and same figure of merit consistently available from satellites). Since early testing efforts often focused on evaluating the tracking and guidance aspects of GPS receivers (vice stationary survey applications) few (if any) operators performed such detailed analysis.

Secondly, the default datums which were initially set up for GPS receiver testing worked just fine in most scenarios and exercises because they were primarily conducted inside CONUS (CONtinental United States). The default datums were selected so that they happened to match the training map products of system evaluators. Even when defaults were intentionally ignored (a rare occurrence as indicated above) the datum transfer error most likely to be seen in North America test locations were approximately 150 meters in total distance. This worst case error of approximately 180 meters (~50 m from datum mismatch + ~30 m from ephemeris based plotting) was still far better than the 1/4 - 1/2 mile performance of earlier systems. Any gadget which could produce localization co-ordinates literally from "thin air" was regarded as a marvelous, almost magical invention for ground units which had become lost or disoriented during severe weather or complex maneuver activities. A 90 meter search radius for a re-orientation landmark of some sort was considered perfectly acceptable compared to alternative position fix of 1/2 mile or no assistance at all.

A third reason for this datum mismatch insensitivity can be seen through a historic perspective from Desert Storm. The significant buildup period which occurred between Desert Shield's contingency reaction and Desert Storm's combat operations allowed for the distribution of a large number of GPS receivers to combat and support units in theater. Commensurate with this demanding logistical feat was the dissemination of colossal number of new map products which were naturally produced off of most recent survey datum: WGS 84. This allowed the U.S. military to unwittingly impose a standardized datum reference for use throughout the theater of operations almost by accident.

Since the full GPS constellation of satellites was not available at the time hostilities commenced, the vast majority of GPS related issues reported after Desert Storm were concerned with coverage blackouts, signal degradation, and limited distribution of Small Lightweight GPS Receivers (SLGRs)[2][6]. Because the vast majority of map products used during combat operations happened to coincide with the WGS-84 default, few if any datum matching problems were ever encountered. If a GPS operator happened to use a his receiver with a local atlas or chart of some kind, he typically wouldn't encounter any significant datum matching errors because the most of the geodetic products indigenous to the middle east were based on U.S. surveys anyway (WGS-72, WGS-84, etc.).

Because Desert Storm's success was widely perceived as a battlefield endorsement for the U.S. military's significant technology development efforts, GPS receivers were widely regarded as \trouble free solution to ground unit navigation problems. As quoted by a senior combat commander: "This (GPS) was the biggest combat multiplier on the battlefield. If we spend a nickel, spend it on these." [6]. This implicit stamp of approval which GPS received from military leadership at all levels further served to trivialize the datum matching problem.

SOF SIGNIFICANCE

As OOTW (Operations Other Than War) activities became increasingly significant in the aftermath of Desert Storm, the need for truly surgical strikes and long range insertion operations became paramount. GPS users were thereby forced to become more familiar with the limitations and operating requirements of their newly developed navigation aids (NavAids). The growing realization that some gadgets don't always perform as advertised in remote areas has raised concern for fault identification and isolation. Advanced NavAid users within the SOF community have become particularly sensitive to this problem because of their common requirement to conduct operations based on relatively antiquated map products used by the indigenous forces which they support [7].

The vast majority of the joint military community, however, is only recently beginning to realize the ramifications of datum transfer problems between a various map products (such as satellite imagery, photo maps, EW intercept plots, etc.) and modern NavAids. In the past, conventional forces relied almost exclusively on visual identification prior to taking action on positional data via firepower, insertion of troops, etc. Reported coordinates were further identified by either a target description (tank, artillery piece, etc.) or a piece of terrain of some sort (hilltop, intersection etc.). Even if large datum mismatch errors were incurred in some long range or coalition type activity, visual confirmation of the actual area in question usually made the issue moot.

Today's surgical mission profiles, however, do not always afford such convenient reference to target descriptions or terrain features. Underground facilities and dense vegetation often conceal target description features from overhead reconnaissance and delivery systems (strike aircraft, airborne FACs, artillery forward observers , etc.). Hence a pilot or observer may not get a warm fuzzy on target confirmation before the need to deliver ordinance becomes critical. Instead, a variety of terminal guidance signaling schemes have been employed to achieve confirmation before dropping. But if placement of the signaling device is offset due to datum mismatch problems, immediate transfer errors are incurred even before figuring in weapons delivery accuracy and munitions effects. Thus, strike activities which are directed against concealed or unobtrusive targets can suffer tremendous inefficiency from datum mismatch problems. As discussed in [7], this effect has recently been recognized as a major contributor to fratricide and combat ID problems in general.

Even as problematic as this terminal signaling solution can be, it is not even an option for many SOF insertion / extraction operations due to OPSEC requirements. Because signaling devices are difficult to view in dense jungle and are often undesirable in wide open terrain (due to long range enemy detection), SOF often prefer to delay signaling until retrieval platforms (aircraft, boats, etc.) come close enough to confirm their intention. If datum mismatch errors offset the platform's route enough to raise suspicion of their intent (700 meters is a long way off in the jungle when trying to identify helicopters by rotor noise), SOF may not desire or be able to signal at all. In any case, this terminal guidance option is rarely available during infiltration activities. Hence, infiltration routes which are

offset by datum mismatch errors will typically remain uncorrected except by visual terrain identification: which is obviously quite difficult in a featureless desert or triple canopy jungle. Thus, datum mismatch problems present a very serious threat to SOF insertion and extraction activities: 1) because we have a compelling requirement to work off of indigenous map products, and 2) because we often cannot afford to rely on terminal guidance signaling methods to answer our address our precision navigation requirements.

COMPENSATION SHORTCOMINGS

Recent observations during night CAS and combat ID studies discussed during [7] indicates that this pervasive yet obscure datum mismatch problem persists today throughout the joint military community and threatens the efficiency and safety of combat operations world wide. Well then, what are we doing to address it?

The most common approach the datum matching problem is to standardize all available map products in a given area prior to the commencement of operations (See [5]). Not only does this tendency to "fight the last war" (e.g. Desert Storm) initially appear to be quite costly, it may actually be infeasible in terms of the rapid deployment scenarios common to OOTW / SOF mission profiles. The blanket supersession of indigenous map products may also be unwise for other reasons.

Many indigenous map products may contain critical historical landmarks or detailed data which is unavailable on more modern reference material. Hence, the dilapidated church ruins which denote a key linkup site or hostage barricade target may not even appear on recently surveyed map products or overhead imagery. There is some evidence to indicate that key hostile entities have been able to escape U.S. persecution efforts due to this effect. In addition to the obvious detriment this approach imposes on operational efficiency, the rejection of indigenous map products may also serve to project an imperious, even pompous U.S. attitude toward the local populace. Therefore, SOF must always maintain the flexibility to work off of indigenous map products in order to support foreign assistance objectives and U.S. interests world wide.

Another operational problem with the standardization approach lies in its failure to compensate for datum differences encountered with data downlink from other advanced overhead platforms. A fairly large family of advanced intelligence collection platforms were launched or fielded before GPS was available. These systems use some other process (such as inertial navigation-INS, celestial reference, etc.) to provide location fixes for the information they acquire. An uniformed customer may unwittingly incur a significant datum mismatch error simply by plotting data directly as is received from the downlink. Consider for example, an INS equipped intercept platform which is initialized on a runway in North America with a map product surveyed on a NA27 datum. This platform then proceeds to provide intercept information over a foreign area of interest which is then plotted by a customer using a WGS 84 map product. This process automatically incurs a 8 meter by 160 meter datum transfer factor in addition to the standard intercept error experienced by the intercept gadget itself. If the customer

happens to be a SOF operator who happens to be working off of an indigenous map from the Ireland 65 datum, the error is increased to 506 meters by 122 meters! It is unlikely in this period of military budget cuts, that all of these intercept and collection platforms will be retrofitted with GPS receivers soon. Thus, we cannot afford to become GPS obsessive and simply distribute a blanket of WGS 84 maps, without regard for datum transfer procedures with non GPS gadgetry.

We can now see that ***although the datum standardization campaign approach certainly has merit for reducing datum mismatch problems in large conventional force engagements, it is totally inadequate for typical SOF mission profiles involving worldwide coalition support and surgical influence requirements.*** Conventional forces should also continue to expand their corrective measures beyond the WGS 84 standardization however, for if this technique was truly effective, then datum mismatch would not have surfaced as major issue as recently as November 96 during [7].

Another alarming aspect of this problem is many staff personnel seem to think that since some ground operators have access to GPS receivers which can effectively transfer coordinates between datums, the issue is insignificant. One problem with this approach is that the GPS specific transfer process is fairly simple, but quite tedious and time consuming. It's not the type of thing one would enjoy doing while requesting Close Air Support, or copying operational overlays. ***The main problem here, however, is that it makes the ground operator absolutely dependent on gadgetry for operational effectiveness - an unwise move by any military standard. It does little to support the typical coalition foot soldier who is equipped with a rifle, an outdated local map product and a compass (if he's lucky).***

RECOMMENDED SOLUTION

As with many technology development problems, the most effective response to this invasive and potentially dangerous issue lies in the modification of Tactics, Techniques and Procedures (TTP) to both increase datum mismatch sensitivity, and promote effective transfer procedures where needed. ***The bottom line is that any coordinate plot which is intended for dissemination to other customers or map products should be considered worthless unless it is accompanied by a specific datum reference: much the same way that latitude requires a N/S designation, or UTM coordinates require a grid zone designator.*** Although this policy may seem a bit harsh at first, it actually represents the simplest, most frugal solution to the problem.

Other measures can certainly serve to support this policy. for example, placing transfer instructions in map product margins as indicated in enclosure 3, will assist in developing sensitivity for a particular customer group using that map product. But as with many automobile drivers who don't read their vehicle owner's manual, many map users disregard or even dispose of map product marginal data.

In any case, we absolutely must resist the tendency to address such problems with a gadget intensive obsession or mindset. The only sure way to address the problem is to have the customer who is receiving coordinates require the sender to pass datum references along with them. This will force the sending ground unit / agency / gadget operator to become aware of his datum reference and the ramifications of mismatch errors. ***Thus, this paper calls for the immediate revision of critical coordinate transfer publications and training aids (such as JFIRE procedures, intelligence collection target lists, etc.) to include a datum reference field which is attached to every coordinate sent.*** The default datum for much of these will undoubtedly be WGS 84, but an assumed datum reference is obviously quite dangerous for the reasons stated above. We owe this degree of scrutiny and attention to detail to a nation which depends on our ability to defend them effectively, and to all of the soldiers, sailors, and airmen who entrust us with their lives.

REFERENCES:

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[2] U.S. DOD Final Report to Congress: Conduct of the Persian Gulf War, U.S. Govt. Printing Office, WashingtonD.C., April 1992.

[3] U.N. & International Atomic Agency Report: Monitoring + Verification of Iraq's Weapons of Mass Destruction Under U.N. Security Council Resolutions 687, 707, 715, U.N. Security Council, New York, NY, 08 April 1991.

[4] U.S. Defense Mapping Agency Technical Manual 8358.1, US DMA, Washington D.C., Sep 1990.

[5] USASOC Message dated 04 June 1996 SUBJ: Korea As An Area Of Interest/Operation (Tokyo Datum Map Product Replacement).

[6] U.S. Army Center for Lessons Learned (CALL) Newsletter No. 91-3, USA CAC, Ft. Leavenworth KS, October 1991.

[7] OSD Joint Night Close Air Support Joint Feasibility Study, 53rd Air Wing,Eglin AFB, FL, November 1996.

List of Enclosures:

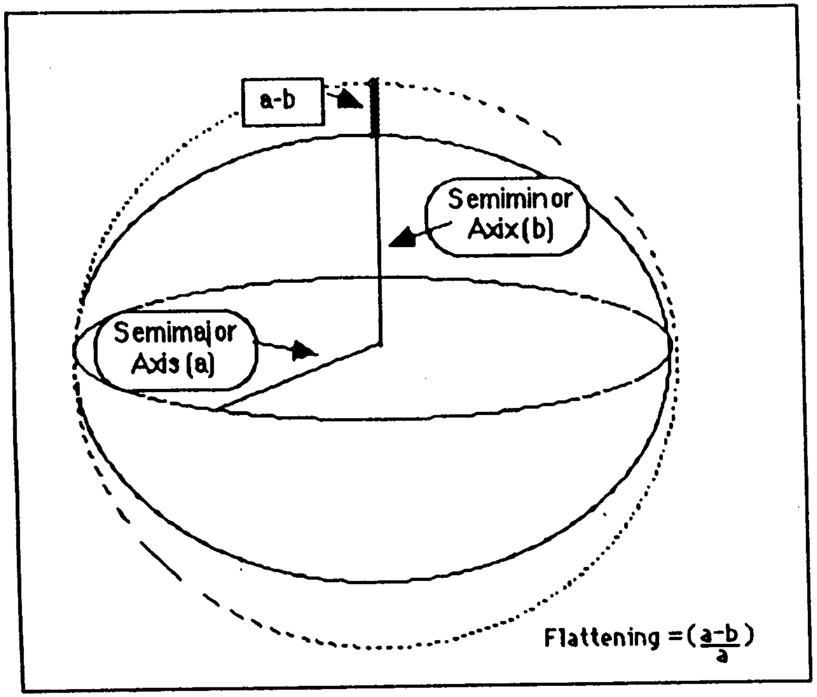
Encl. 1. Extract from the Magellan GPS NAV 1000M users' guide, Magellan Navigation, 1988.

Encl. 2. Defense Mapping Agency Technical Manual 8358.1 extract - Molodenskiy Transformation Constants, US DMA, Sep 1990.

Encl. 3. 1:50,000 map series of Bogota Columbia with datum transfer overlays

Enclosure 1-1

TABLE OF CONSTANTS



Ellipsoid Model of the Earth

MOLODENSKIY TRANSFORMATION CONSTANTS LOCAL DATUM TO WGS '84

Datum	ELLIPSOID	Δa	Δf x 10000	ΔX(m)	ΔY(m)	ΔZ(m)
Adindan (Ethiopia, Sudan)	Clarke 1880	-112.145	-0.54750 714	-162	-12	206
Arc 1950 (Lesotho, Zaire, Zambia)	Clarke 1880	-112.145	-0.54750 714	-143	-90	-294
Australian Geodetic (Australia)	GRS 67	-23	-0.00081 204	-133	-48	148

TABLE OF CONSTANTS (cont.)

Datum	ELLIPSOID	Δa	Δf x 10000	ΔX(m)	ΔY(m)	ΔZ(m)
Bukit Rimpah (Indonesia)	Bessel	739.845	0.10037 483	-384	664	-48
Camp Area Astro (Antarctica)	International	-251	-0.14192 702	-104	-129	239
Djakarta (Indonesia)	Bessel	739.845	0.10037 483	-377	681	-50
European 1950 (Federal Republic of Germany, Norway, Spain)	International	-251	-0.14192 702	-87	-98	-121
Geodetic Datum 1949 (New Zealand)	International	-251	-0.14192 702	84	-22	209
Ghana (Ghana)	War Office	163.58	0.25567 714	NOT AVAILABLE		
Guam 1963 (Guam)	Clarke 1866	-69.4	-0.37264 639	-100	-248	259
Gunung Segara (Borneo (Southeast))	Bessel	739.845	0.10037 483	-403	684	41
Gunung Serindung 1962	Bessel	739.845	0.10037 483	NOT AVAILABLE		
Herat North (Afghanistan)	International	-251	-0.14192 702	-333	-222	114
Hjorsey 1955 (Iceland)	International	-251	-0.14192 702	-73	46	-86
Hu-Tzu-Shan (Taiwan)	International	-251	-0.14192 702	-634	-549	-201

Enclosure 1-2

TABLE OF CONSTANTS (cont.)

Datum	ELLIPSOID	Δa	Δf x 10000	ΔX(m)	ΔY(m)	ΔZ(m)
Indian (India)	Everest	860.655	0.28361 368	173	750	264
Ireland 1965 (Eire 1965) (Ireland)	Mod. Airy	796.811	0.11960 023	506	-122	611
Kertau 1948 (Malayan Revised Triangulation) (Malaysia)	Mod. Everest	832.937	0.28361 368	-11	851	5
* Liberia 1964 (Liberia)	Clarke 1880	-112.145	-0.54750 714	-90	40	88
Luzon (Philippines)	Clarke 1866	-69.4	-0.37264 639	-133	-77	-54
Merchich (Morocco)	Clarke 1880	-112.145	-0.54750 714	31	146	47
Montjong Lowe	Bessel	739.845	0.10037 483	NOT AVAILABLE		
Nigeria (Nigeria)	Clarke 1880	-112.145	-0.54750 714	-92	-93	122
North American 1927 CONUS (California, Michigan, Texas, Virginia, Kansas)	Clarke 1866	-69.4	-0.37264 639	-8	160	176
North American 1927 Alaska and Canada (Alaska, British Columbia, Ontario, Quebec)	Clarke 1866	-69.4	-0.37264 639	-9	151	185
Old Hawaiian, Maui (Maui)	International	-251	-0.14192 702	210	-230	-357
Old Hawaiian, Oahu (Oahu)	International	-251	-0.14192 702	201	-224	-349

TABLE OF CONSTANTS (cont.)

Datum	ELLIPSOID	Δa	Δf x 10000	ΔX(m)	ΔY(m)	ΔZ(m)
Old Hawaiian, Kauai (Kauai)	International	-251	-0.14192 702	190	-230	-341
Ordnance Survey of Great Britain 1936 (Scotland, England, Wales)	Airy	573.604	0.11960 023	375	-111	431
Qornoq (Greenland)	International	-251	-0.14192 702	164	138	-189
Sierra Leone 1960	Clarke 1880	-112.145	-0.54750 714	NOT AVAILABLE		
South America (Campo Inchauspe) (Columbia, Chile, Guyana, Peru)	International	-251	-0.14192 702	-148	136	90
South America (Chua Astro) (Brazil)	International	-251	-0.14192 702	-134	229	-29
South America (Corrego Alegre) (Argentina)	International	-251	-0.14192 702	-206	172	-6
South America (Provisional South American 1956) (Paraguay)	International	-251	-0.14192 702	-288	175	-375
South America (Yacare) (Uruguay)	International	-251	-0.14192 702	-155	171	37
Tananarive Obsv. 1925 (Madagascar)	International	-251	-0.14192 702	-189	-242	--91

TABLE OF CONSTANTS (cont.)

Datum	ELLIPSOID	Δa	$\Delta f \times 10000$	ΔX(m)	ΔY(m)	ΔZ(m)
Timbalai 1948 (Malaysia)	Everest	860.655	0.28361 368	-689	691	-46
Tokyo	Bessel	739.845	0.10037 483	-128	481	664
Voirol	Clarke 1880	-112.145	-0.54750 714	NOT AVAILABLE		
Special Datums (SD) MGRS related, Indian Special (Thailand, Laos)	Everest	860.655	0.28361 368	173	750	264
SD, Luzon Special (Philippines)	Clarke 1866	-69.4	-0.37264 639	-133	-77	-54
SD, Tokyo Special (Japan)	Bessel	739.845	0.10037 483	-128	481	664
Default Datum, WGS 84	WGS 84	0.0	0.0	0	0	0
WGS 72	WGS 72	2.0	0.00031 211	0	0	4.5

ΔX, ΔY, ΔZ are the differences in height from the center of the earth from the WGS model of the earth's surface to the local datum's model of the earth's surface.

Δa = the difference from the WGS semi-major axis to that of the local datum.
Δf (x 10,000) = the difference in flattening from the WGS84 model to the local datum. Flattening = (a-b)/a, where a = semi-major axis and b = semi-minor axis.

GLOSSARY

ACQUISITION — Referring to signal acquisition, when the NAV 1000M locates and receives data from the GPS satellites.

ALMANAC — Information the NAV 1000M obtains from a single satellite, containing data on the general location and health of all satellites in the GPS constellation.

ANTENNA ALTITUDE — The sum of the elevation (zero at sea level) and the antenna height.

BEARING/AZIMUTH — The direction you are moving in relation to a destination or target.

C/N_0 — Carrier-to-noise ratio is an absolute means of specifying Signal-to-noise ratio (SNR) that is independent of band width.

DEFAULT — The displayed or system selected choice. If you do not want to use the default (automatic) value, you can erase it and enter your own choice.

ELLIPSOID — An idealized mathematical model of the earth's surface used in developing charts. Based on the ellipse of rotation.

MOLODENSKIY TRANSFORMATION CONSTANTS
LOCAL DATUM TO WGS 84

Datum	ELLIPSOID	ΔX (m)	ΔY (m)	ΔZ (m)	Δa	Δf x 10⁴
1. North American 1927	Clarke 1866				-69.4	-0.37264 639
except Alaska		-8	160	176		
Alaska		-5	135	172		
2. Old Hawaiian	Clarke 1866	61	-285	-181	-69.4	-0.37264 639
3. Qornoq	International	164	138	-189	-251	-0.14192 702
4. Hjorsey 1955	International	-73	46	-86	-251	-0.14192 702
5. Provisional South American 1956	International				-251	-0.14192 702
Bolivia		-270	188	-388		
Chile		-270	183	-390		
Colombia		-282	169	-371		
Ecuador		-278	171	-367		
Guyana		-298	159	-369		
Venezuela		-295	173	-371		
Peru		-279	175	-379		
6. Corrego Alegre	International	-206	172	-6	-251	-0.14192 702
7. Chua Astro	International	-134	229	-29	-251	-0.14192 702
8. Campo Inchauspe	International	-148	136	90	-251	-0.14192 702
9. Yacare	International	-155	171	37	-251	-0.14192 702
10. European 1950	International				-251	-0.14192 702
except Iberia		-87	-96	-120		
Iberia		-88	-109	-122		
11. Ordnance Survey of Great Britain 1936	Airy	375	-111	431	573.604	0.11960 023
12. Ireland 1965	Mod. Airy	506	-122	611	796.811	0.11960 023
13. Merchich	Clarke 1880	31	146	47	-112.145	-0.54750 714
14. Adindan	Clarke 1880				-112.145	-0.54750 714
Ethiopia		-165	-11	206		
Sudan		-161	-14	205		

Table 2. Molodenskiy Transformation Constants to Convert From Local Datum to WGS 84 (page 1 of 3).

Enclosure 2-1

Enclosure 2-2

15. Liberia	Clarke 1880	-90	40	88	-112.145	-0.54750 714
16. Minna	Clarke 1880	-92	93	122	-112.145	-0.54750 714
17. Arc 50	Clarke 1880				-112.145	-0.54750 714
Botswana		-138	-105	-289		
Kenya		-161	-7	-300		
Lesotho		-125	-108	-295		
Uganda		-158	12	-299		
Zaire		-169	19	-278		
Zambia		-147	74	-283		
Zimbabwe		-142	96	-293		
18. Tananarive Obsv. 1925	International	-189	-242	-91	-251	-0.14192 702
* 19. Tokyo	Bessel 1841	-128	481	664	739.845	0.10037 483
20. Hu-Tzu-Shan	International	-634	-549	-201	-251	-0.14192 702
21. Luzon	Clarke 1866	-133	77	-51	-69.4	-0.37264 639
22. Kertau 1948	Mod. Everest	11	851	5	832.937	0.28361 368
23. Timbalai 1948	Everest	-689	691	-46	860.655	0.28361 368
24. Djakarta	Bessel 1841	-377	681	-50	739.845	0.10037 483
25. Bukit Rimpah	Bessel 1841	-384	664	-48	739.845	0.10037 483
26. Gunung Segara	Bessel 1841	-403	684	41	739.845	0.10037 483
27. Australian Geodetic 1966	Australian Nat.	-133	48	148	-23	-0.00081 204
28. Geodetic Datum 1949	International	84	22	209	-251	-0.14192 702
29. Guam 1963	Clarke 1866	-100	-248	259	-69.4	-0.37264 639
30. Local Astro	Transformations are not available for areas referenced to multiple astronomic stations. When a single astronomic station is used, a transformation may be possible, such as:					
Naparima Trinidad and Tobago	International	-2	374	172	-251	-0.14192 702

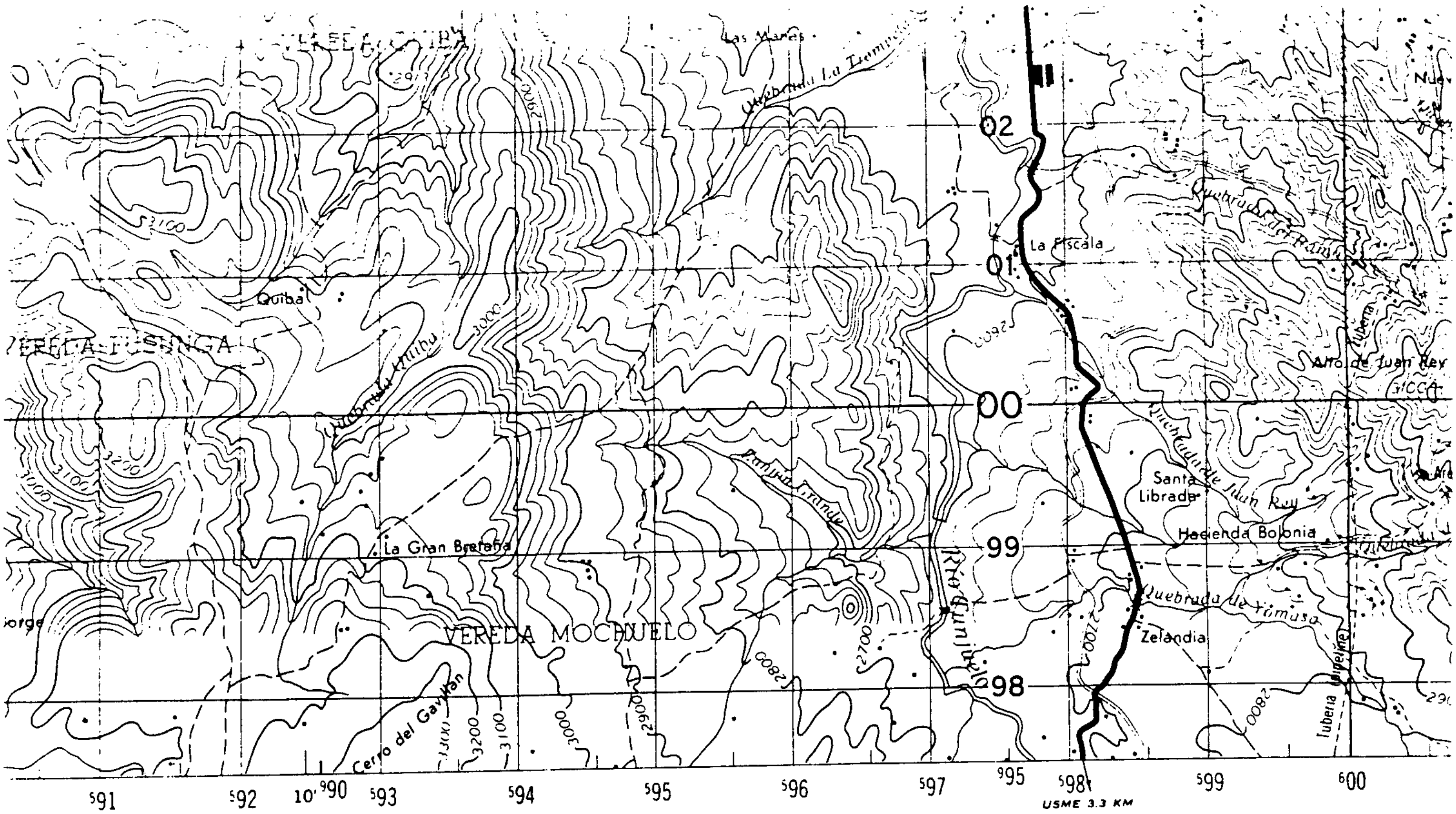
Table 2. Molodenskiy Transformation Constants to Convert From Local Datum to WGS 84 – continued.

31. Camp Area Astro	International	-104	129	239	-251	0.14192 702

Note: These shift constants are the best available at the time of publication.
The latest values may be obtained from DMA, ATTN: PR.

Table 2. Molodenskiy Transformation Constants to Convert From Local Datum to WGS 84 – continued.

Enclosure 2-3



Scale 1:50,000

1 ½ 0 1 2 3 Statute

1000 500 0 1000 2000 3000 4000 Meters

1000 500 0 1000 2000 3000 4000 Yards

1 ½ 0 1 2

CONTOUR INTERVAL 25 METERS

VERTICAL DATUM MEAN SEA LEVEL

TRANSVERSE MERCATOR PROJECTION

HORIZONTAL DATUM PROVISIONAL SOUTH AMERICAN DATUM OF 1956

* TO REFER THE GRATICULE AND UTM GRID VALUES ON THIS SHEET TO BOGOTÁ DATUM (OBSERVATORIO ASTRONÓMICO NACIONAL DE BOGOTÁ)

* SUBTRACT 1.4 SECONDS FROM THE LATITUDE VALUES AND SUBTRACT 45 METERS FROM THE UTM GRID NORTHINGS

ADD 19.6 SECONDS TO THE LONGITUDE VALUES AND SUBTRACT 604 METERS FROM THE UTM GRID EASTINGS

BLACK NUMBERED LINES INDICATE THE 1,000 METER UNIVERSAL TRANSVERSE MERCATOR GRID ZONE 18, INTERNATIONAL SPHEROID

BROWN NUMBERED TICKS INSIDE THE NEATLINE INDICATE THE 1,000 METER LOCAL GAUSS GRID OF COLOMBIA, ZONE B REFERRED TO THE OBSERVATORIO ASTRONÓMICO NACIONAL DE BOGOTÁ

CURVAS DE NIVEL A INTERVALOS DE 25 METRO

DATO VERTICAL NIVEL MEDIO DEL MAR

PROYECCIÓN TRANSVERSA DE MERCATOR

DATO HORIZONTAL EL PROVISIONAL DE 1956 PARA AMERICA DEL SUR

PARA REFERIR LA PROYECCIÓN Y CUADRICULAR UTM DE ESTA HOJA AL D BOGOTÁ (OBSERVATORIO ASTRONÓMICO NACIONAL DE BOGOTÁ)

SE RESTA 1.4 SEGUNDOS DE LOS VALORES DE LATITUD Y SE RESTA 45 METROS DE LATITUD DEL CUADRICULAR UTM

SE SUMA 19.6 SEGUNDOS A LOS VALORES DE LONGITUD Y SE RESTA 604 METROS DE LONGITUD DEL CUADRICULAR UTM

LAS LÍNEAS NUMERADAS EN NEGRO INDICAN LA CUADRÍCULA UNIVERSAL TR DE MERCATOR, CON ESPACIAMIENTOS DE 1 000 METROS, ZONA 18, ESFEROIDE IN

LAS MARCAS INTERNAS DE LA LÍNEA MARGINAL NUMERADAS EN SEPIA INDICAN CUADRÍCULA GAUSS LOCAL DE COLOMBIA ZONA B, CON ESPACIAMIENTOS DE 1 000 REFERIDA AL OBSERVATORIO ASTRONÓMICO NACIONAL DE BOGOTÁ

USERS SHOULD REFER CORRECTIONS, ADDITIONS AND COMMENTS FOR IMPROVING THIS PRODUCT TO DIRECTOR, DEFENSE MAPPING AGENCY TOPOGRAPHIC CENTER, WASHINGTON, D. C. 20315, ATTN: PPO

ENVIAR CORRECCIONES AL DEPARTAMENTO CARTOGRÁFICO DEL INSTITUTO GEOGRÁFICO "AGUSTIN CODAZZI"

GRID ZONE DESIGNATION
DESIGNACIÓN DE LA ZONA DE CUADRICULA

18N

100 000 M. SQUARE IDENTIFICATION
IDENTIFICACIÓN DEL CUADRADO DE 100 000 METROS

WL	XL
WK	XK

$^{5}00$

$^{4}00$

IGNORE the SMALLER figures of any grid number; these are for finding the full coordinates. Use ONLY the LARGER figures of the grid number.

IGNÓRENSE los números de TIPO MENOR de cualquier distancia de cuadrícula, dichos números sólo sirven para conocer el valor completo de las coordenadas. Úsense ÚNICAMENTE los números de TIPO MAYOR.

EXAMPLE EJEMPLO $^{4}98^{000}$

TO GIVE A STANDARD REFERENCE ON THIS SHEET TO NEAREST 100 METERS	PARA DAR UNA REFERENCIA EN ESTA HOJA CON UNA APROXIMACIÓN DE 100 METROS	
SAMPLE POINT	PUNTO UTILIZADO COMO EJEMPLO △	
1. Read the letters identifying 100 000 meter square in which the point lies.	1. Léanse las letras que identifican el cuadrado de 100 000 metros dentro del cual se encuentra el punto.	XL
2. Locate first VERTICAL grid line to LEFT of point and read LARGE figures labeling the line either in the top or bottom margin, or on the line itself.	2. Localícese la línea VERTICAL de la cuadrícula situada inmediatamente a la IZQUIERDA del punto y léase el número en TIPO MAYOR correspondiente a ella, ya sea en el margen superior, en el inferior o sobre la línea misma.	02
Estimate tenths from grid line to point.	Estímense los décimos del intervalo de cuadrícula entre la línea mencionada y el punto.	2
3. Locate first HORIZONTAL grid line BELOW point and read LARGE figures labeling the line either in the left or right margin, or on the line itself.	3. Localícese la línea HORIZONTAL de la cuadrícula situada inmediatamente ABAJO del punto y léase el número en TIPO MAYOR correspondiente a ella, el cual se pueden ver en el margen izquierdo, en el derecho o sobre la línea misma.	13
Estimate tenths from grid line to point.	Estímense los décimos del intervalo de cuadrícula entre la línea mencionada y el punto.	1
SAMPLE REFERENCE	REFERENCIA DE UN PUNTO EJEMPLO	XL022131
If reporting beyond 9° N S or 18° E W prefix Grid Zone Designation as	Si la información abarca una zona mayor de 9° N S - 18° E O, antepóngase a la referencia anterior la Designación de la Zona de Cuadrícula y.a.	18NXL022131

Enclosure 3-1

Panel 3: Notes on "C41 in Coalition Operations"

1. Evidence Based Research has developed a series of tools to access Operations Other Than War (OOTW) working to put OOTW into 2010/20. Command relationships do not follow normal relationships. Dual chain of command - national and coalition - much slower. Revisions are complex and go beyond military matters. US brings leadership, logistics, and communications to OOTW arena. Conclusion: OOTW is very different from standard military operations in all aspects.

2. Technology is starting to solve many C4I problems to include coalition warfare. As SOCOM receives additional missions it requires new technology. US SOCOM integrates new technology and tests in joint exercises. SOF intelligence vehicle is providing intelligence to much lower levels and can provide a joint picture of the battlefield. "Town Crier" - provides a broadcast system to further disseminate intelligence.
Integrated survey program provides fusion and dissemination. SSCN-II exploits Asynchronous Transfer Mode technology. CONDOR exploits commercial cellular phones. SPINNAKER is a broadcast system. Unattended sensors - links and nets and uses SATCOM. SOFTDP "Object Request Broker" provides faster and more efficient communications capability. Heavy emphasis is being placed on testing new systems, do they help? is it faster? does it contribute to mission accomplishment? How does it interface with other systems?

TIDAS=Tactical Intelligence and Dissemination and Analysis System combined with SOF Intelligence Vehicle will provide new capability to coalition partners.
OOTW has many demands; technology may help meet the requirements.

Q: Who is producing all of information and who decides what is disseminated?
A: International commercial standards are now the standard approach. This helps both US and allies.

Q: Communications are vulnerable some testing is being done. Very expensive and threat keeps changing.

Q: Can we protect the US if we give systems to allies?
A: Yes, protection is built into system through encryption.

3. <u>Datum mismatch</u> - maps do not match-data varies. All scales have an error range, moving between maps causes error magnification.

Impacts on spot reports, inquiry, fire support fraticide, SOF missions.

Desert Storm - maps were reissued to everyone, but that requires time and money.

Flexibility is required, Global Positioning System (GPS) is only part of answer. Need to add a field to the datum to identify the map system used. Make the GPS more easily convert map datum.

Advancing
SOF C4I Concepts
in a
Coalition Environment

Future Directions

" Future operations will require more than just being Joint. Allied and Coalition partners must be integrated in and interoperable with BC4I environment."

GEN Shalikashvily

SOCOM Technology Development Objectives

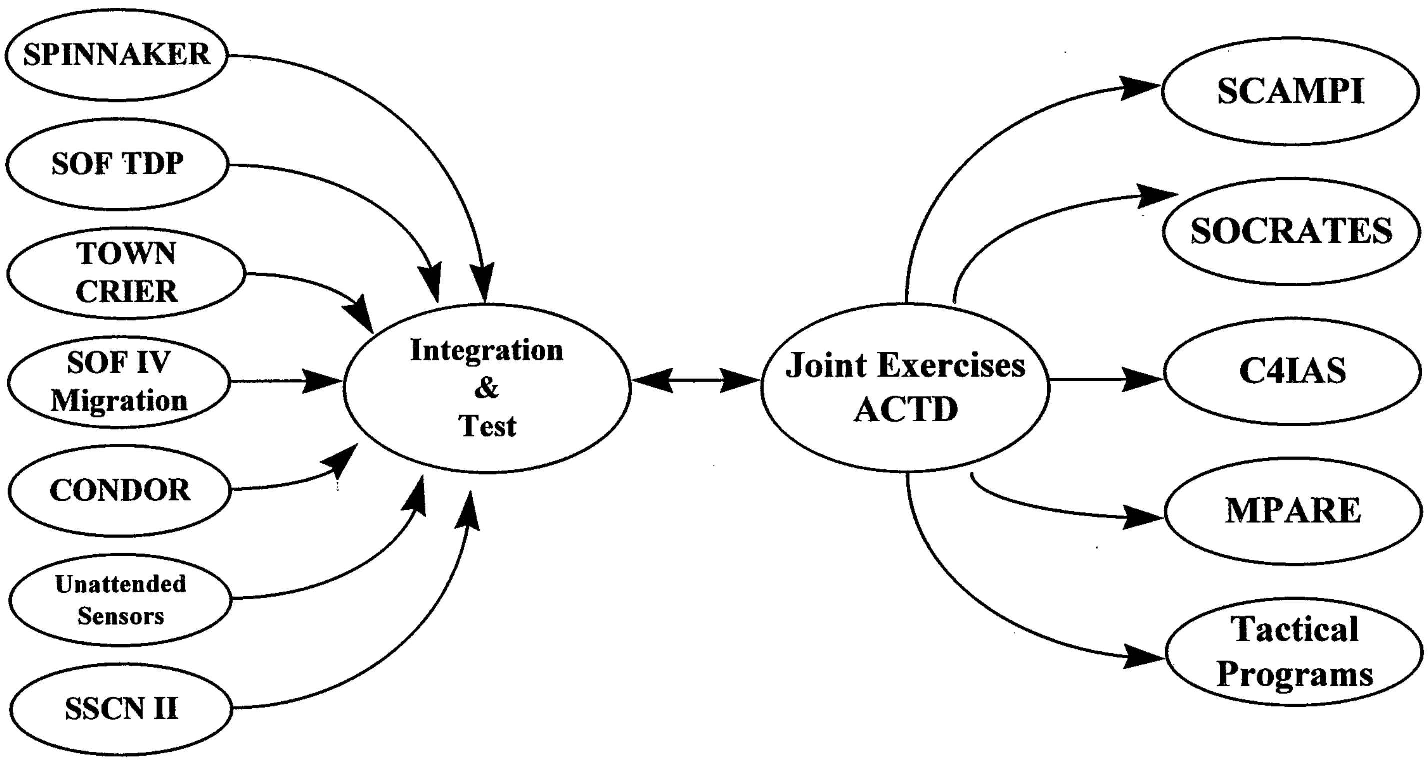
CINCSOC Ltr 1 dated 1 Dec 95:

- Weapons of Mass Destruction (WMD) Detection, Classification, Neutralization, Containerization, and Protection Technologies
- Improved Digital Transmission, Switching, Information Transfer Automation, and Human-to-Human Interface Communications (C4I) Technologies
- Automated Information Warfare (IW) Systems Enhancements to Influence and To Protect Information Systems, Links, and Nodes
- Advanced Learning, Training, and Mission Planning/Rehearsal Technologies

Candidate Initiatives

- SOF INTELLIGENCE VEHICLE
- TOWN CRIER
- INTEGRATED SURVEY PROGRAM
- SECURE SURVIVABLE COMMUNCATIONS NETWORK II
- CONDOR
- SPINNAKER
- UNATTENDED SENSORS
- SOF TDP

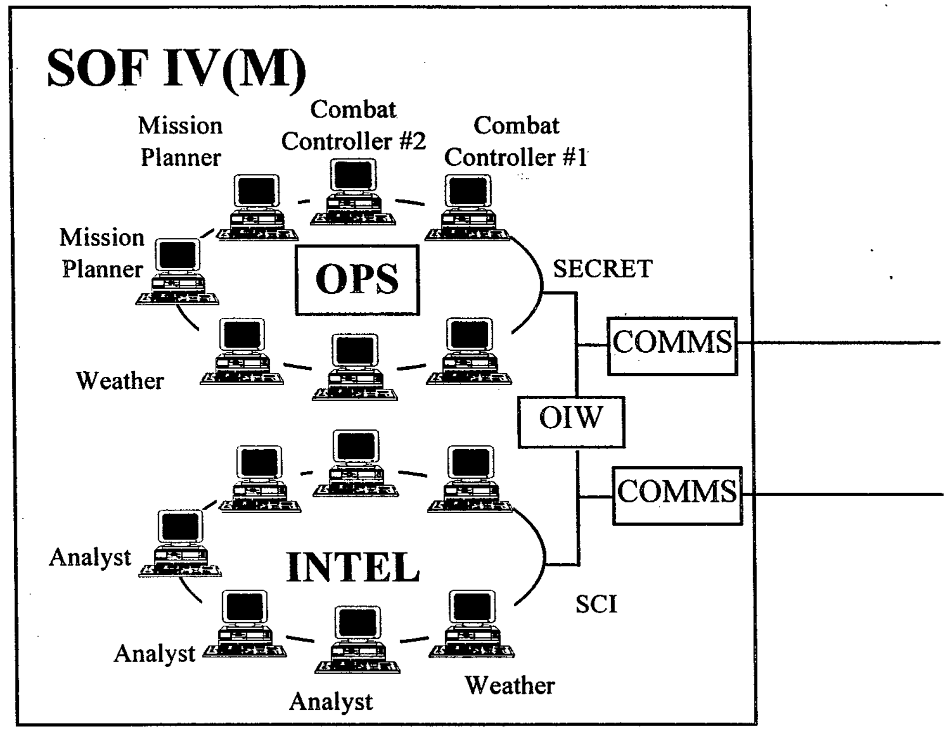
Process



- Integrate Technologies Developed as Individual Efforts
- Operationally Validate Technology Via the ACOM BC4I ACTD
- Transition Proven Technologies into USSOCOM Acquisition Programs IAW DoD 5000

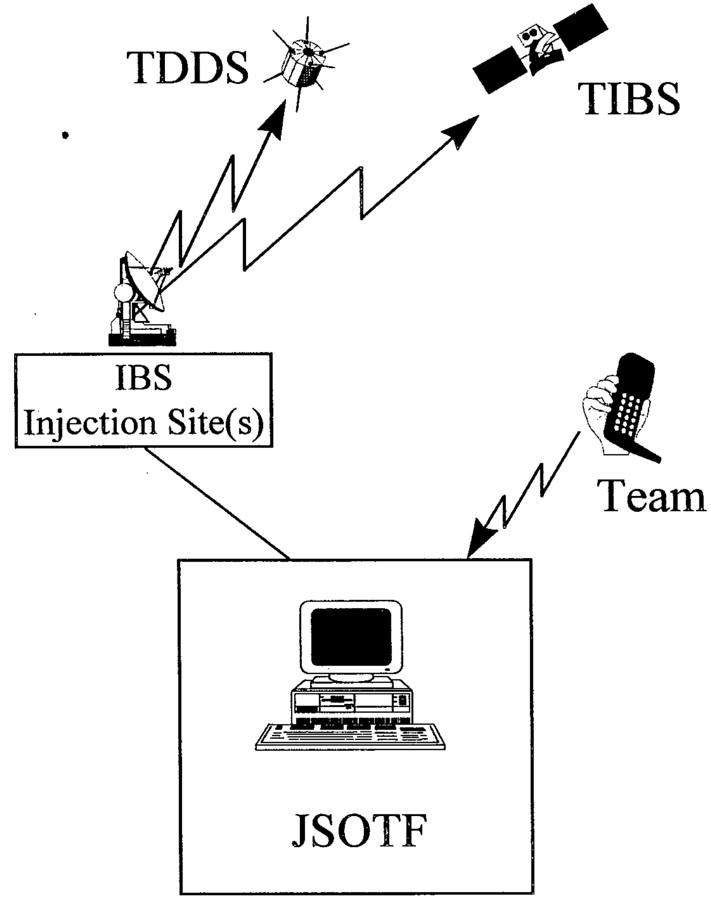
SOF IV Migration

- Evolve SOF IV into a System Capable of Supporting the Mission Functions of an Entire JSOTF
- Functions:
  - Ops Planning and Reporting
  - Dissemination of Orders
  - Monitoring Mission Execution
  - Readiness and Unit Status Monitoring
  - MPARE
  - Intel Analysis and Report
  - Logistic Planning and Tracking
- JDISS/DoDIIS and GCCS Integration



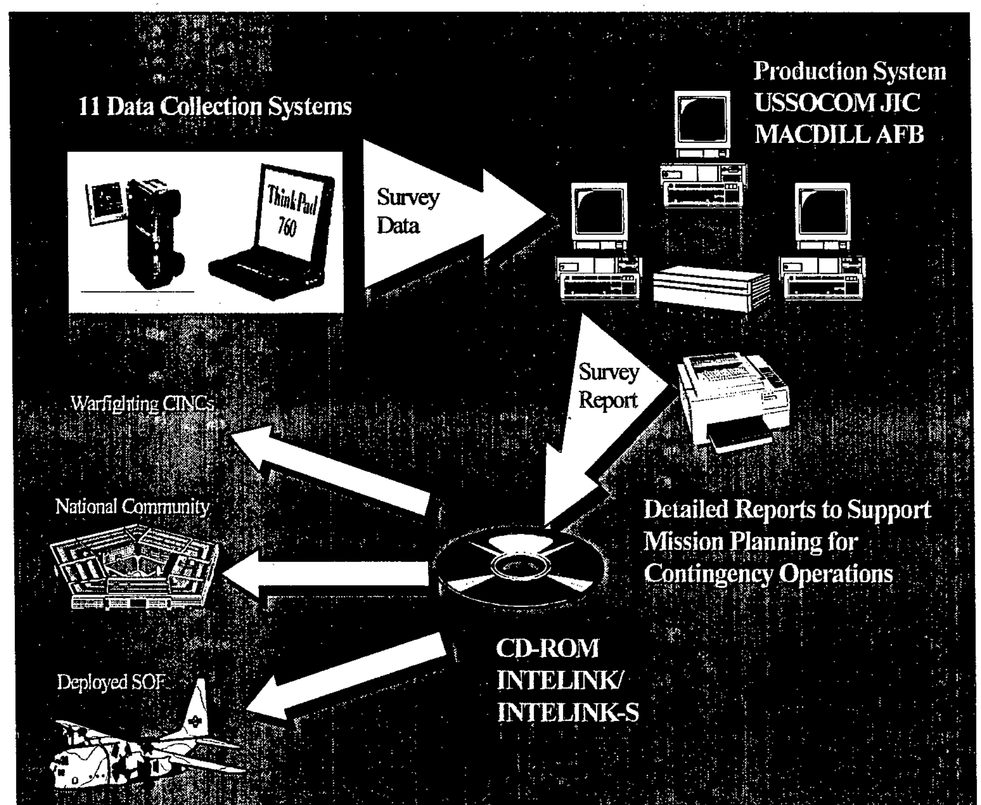
TOWN CRIER

- USSOCOM TENCAP Program
- Investigate Injection Of SOF Generated HUMINT Data Into Tactical Integrated Broadcast Service (IBS)
- Provides Software Application to Format Data for IBS Dissemination To Weapons Platforms



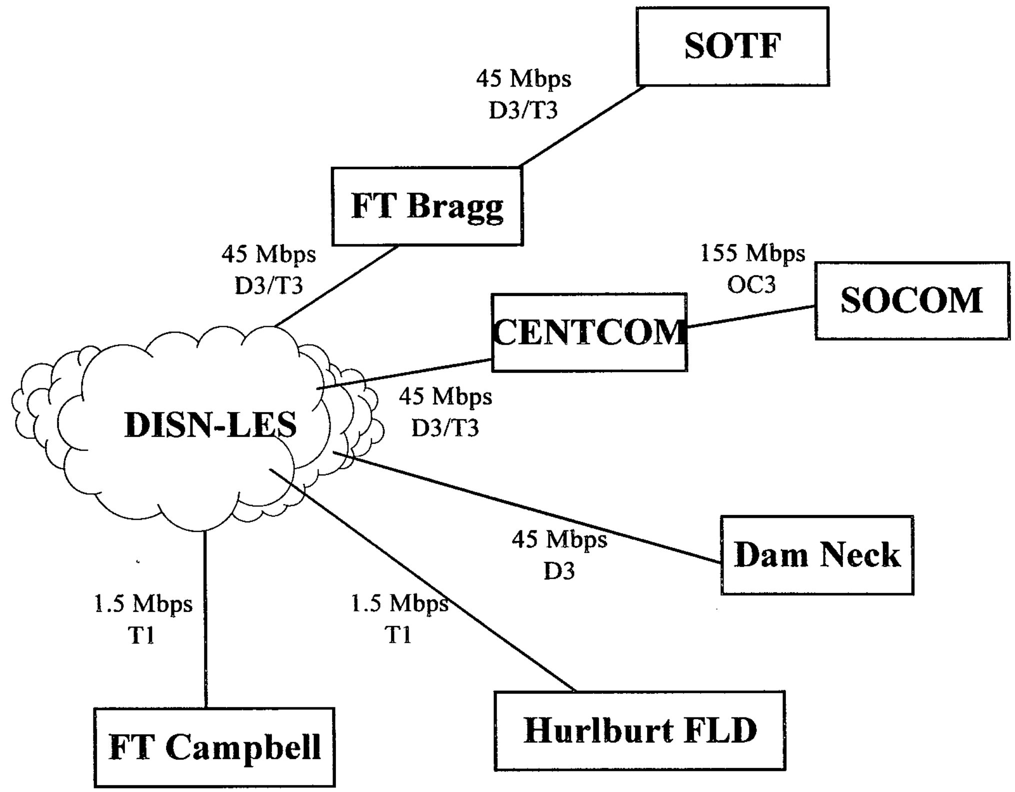
Integrated Survey Program

- Supports contingency planning
- Produces HTML-based multimedia survey products
- Products viewable via Internet browser
- SOCJIC central production element
- Merge RSTs, STPs, ISTs, and MOSPs
- DoDIIS-compliant



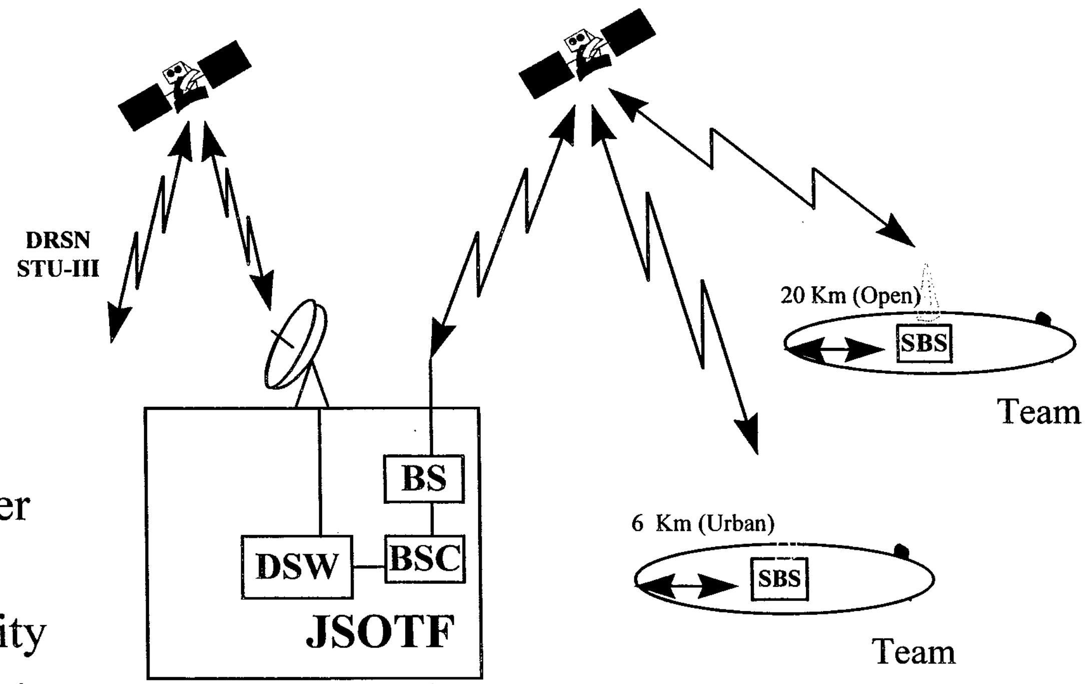
SSCN II

- Rome Lab Initiative for USSOCOM
- Explore Tactical Application of Asynchronous Transfer Mode (ATM) Technology
- Services Supported
  - Mission Planning Whiteboard Exchange
  - Full Motion Video
  - MC&G
  - Imagery
  - Voice
  - Studio VTC
  - SOCOM WAN, GCCS, SIPRNet



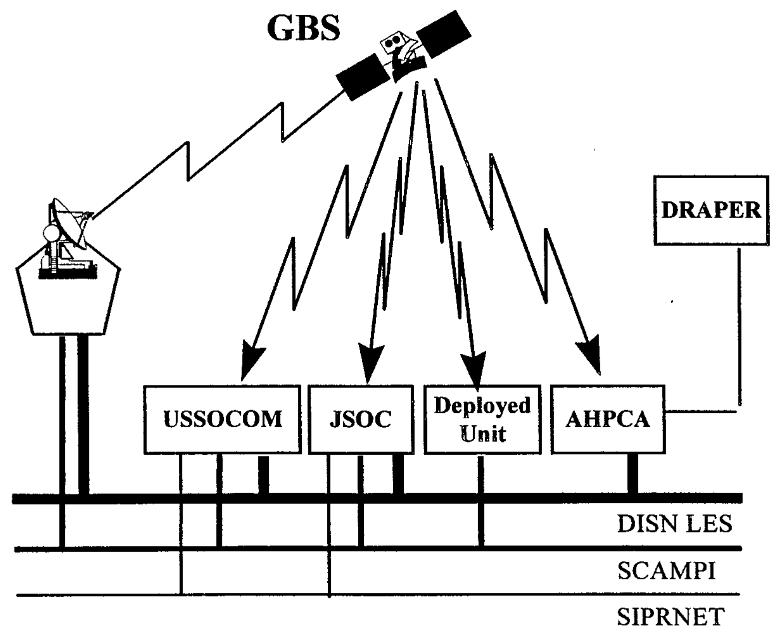
CONDOR

- ACTD
  - NSA
  - USSOCOM
  - JSOC
  - OSD
- Commercial Personal Comms Technology
- Provide Decentralized User Access to C4I
  - Increases User Mobility
  - Increased Security with FORTEZZA Plus Technology



SPINNAKER

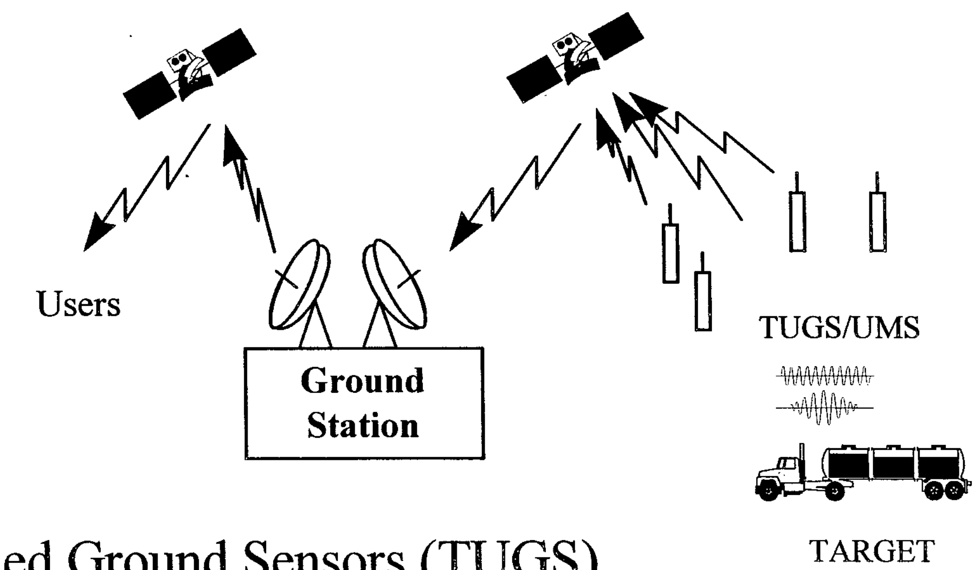
- DARPA Initiative for:
  - USSOCOM
  - JSOC
- Develop, Tailor, And Integrate New and Emerging Technologies to Enhance SOF C4I
- Supports:
  - RF Comms (VSAT, GBS)
  - Mission Planning Whiteboard Exchange
  - Full Motion Video
  - MC&G
  - Imagery
  - Voice
  - Studio VTC
  - SOCOM WAN
  - GCCS



Technology
- SUNSPARC 3000 Servers
- SUNSPARC Ultra 2 Nodes
- Raid Storage
- T3 ATM Connectivity
- GBS
- C2 Security Guard

Unattended Sensors

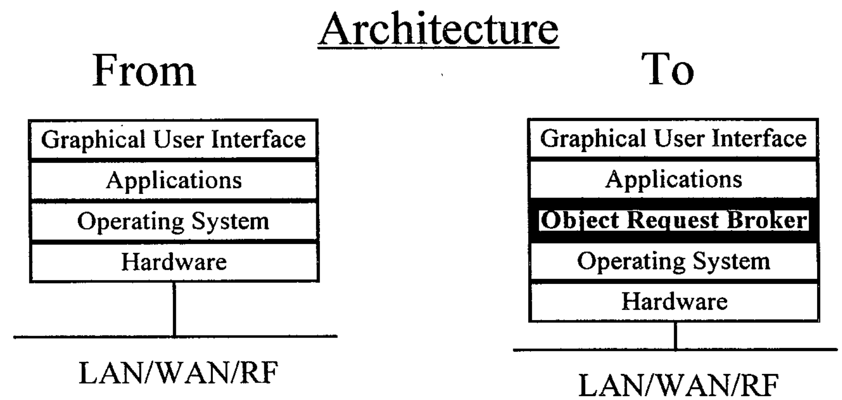
- ACTD
  - DARPA
  - CMO
  - CENTCOM
  - SOCOM

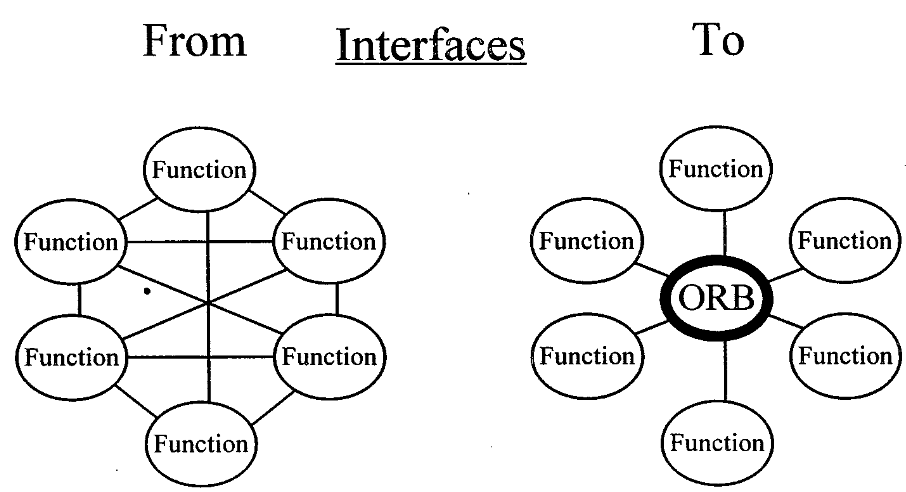


- Sensors
  - Tactical Unattended Ground Sensors (TUGS)
  - Unattended MASINT Sensors (UMS)
- Detect and Report Acoustic, Seismic, Associated Thermal Imagery, and Other Signature Data Collected by Unattended Sensors to Tactical Users

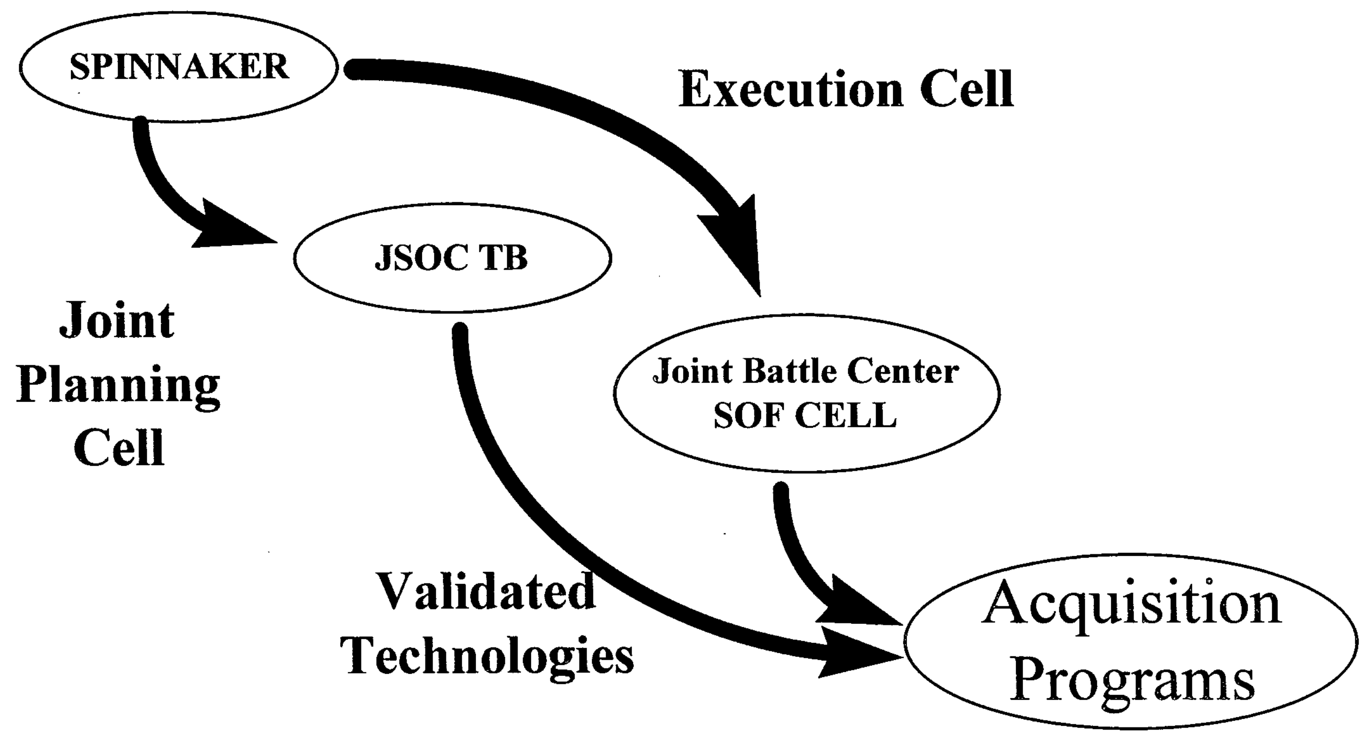
SOF TDP

- Joint Effort
  - USSOCOM
  - Space Warfare Center
  - OSO
  - NRaD
- Provides
  - Scaleable “Plug and Play” S/W Architecture
  - Object Request Broker Technology (CORBA)
  - Harware Independence
  - Distributive Computing



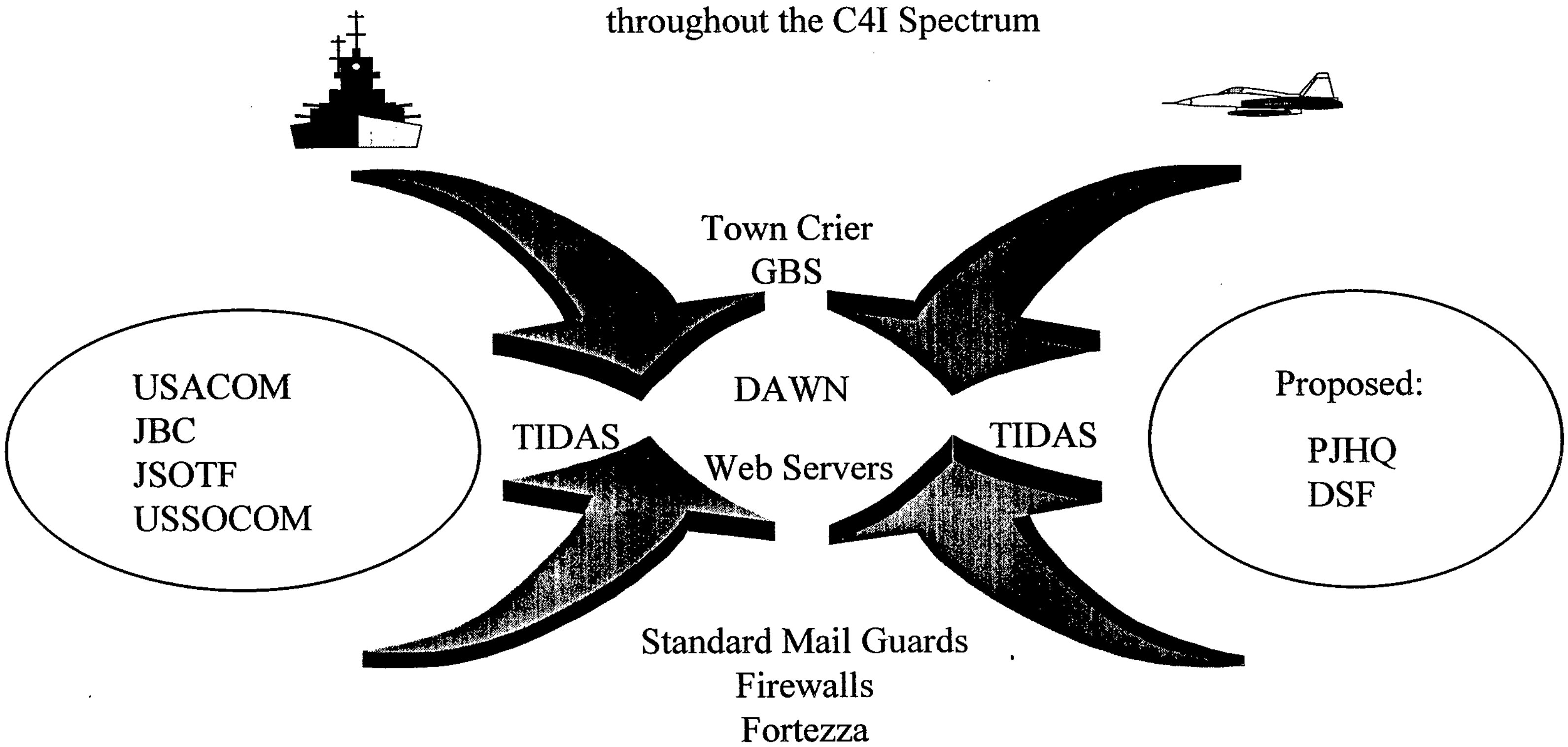


Technology Transfer Process



BC4I Coalition ACTD

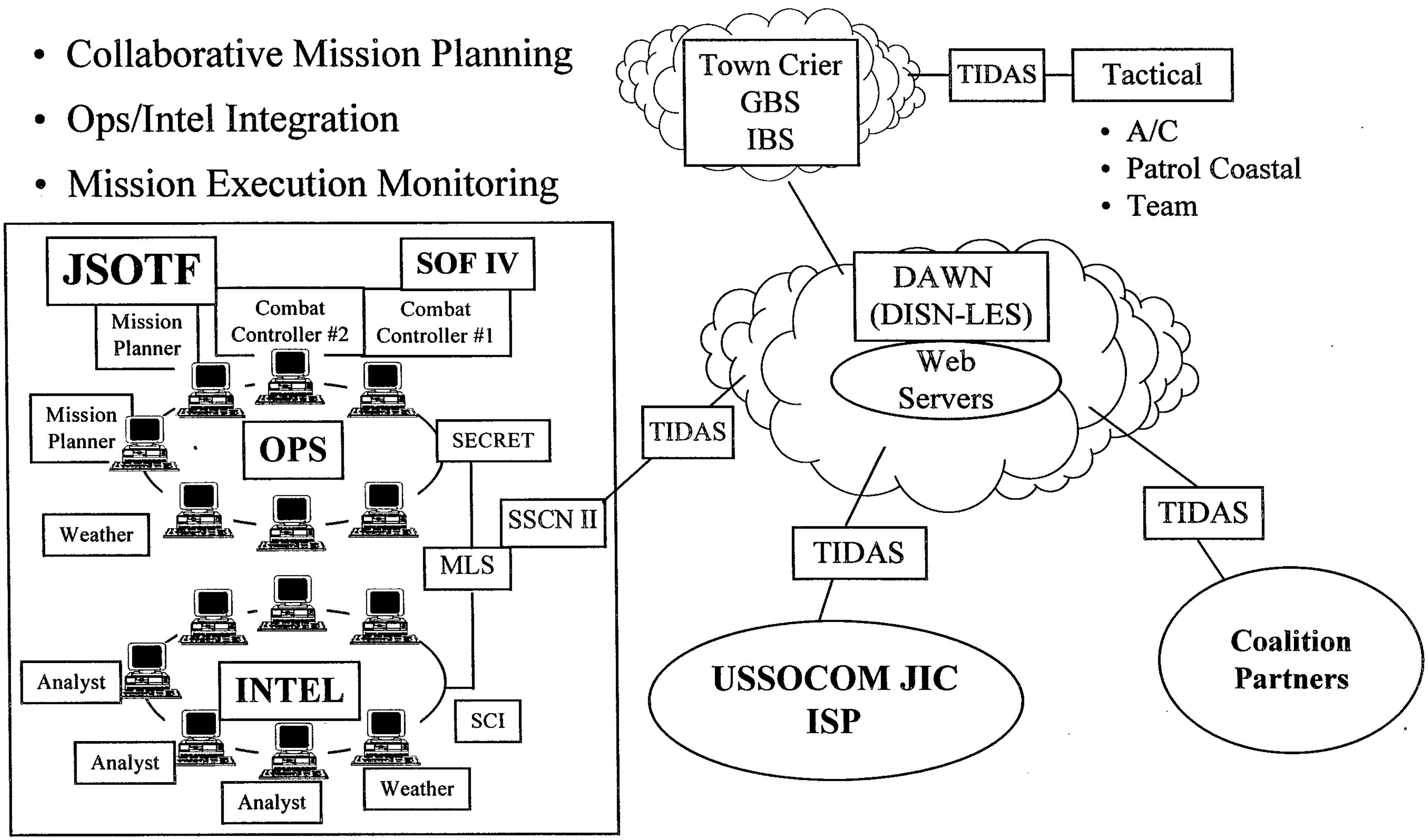
Demonstrate Seamless Logistics, Intel and Operations Information Flow throughout the C4I Spectrum



"Instant" Collaborative Environment
Fully Automated MLS
Coalition Info "Pull" and "Data Mining"

SOF Component

- Collaborative Mission Planning
- Ops/Intel Integration
- Mission Execution Monitoring



Conclusion

USSOCOM initiatives and integration plans will ensure SOF C4I interoperability in future coalition environments.

BACKGROUND: THE EVIDENCE BASE

- CLASSIC C3I WARFIGHTING RESEARCH AND PARAMETER ASSESSMENT EFFORTS
  - Headquarters Effectiveness Assessment Tool (HEAT): 1981-1994
  - Army Command and Control Evaluation System (ACCES): 1985-1994

- DATABASES AND ANALYSES OF INTERNATIONAL OPERATIONS
  - U.S. Military Crisis Involvement: 1945-1978, 1979-1990
  - Department of State Crisis Management Task Forces in the Reagan Administration
  - ONDCP Sponsored Research on Drug Interdiction Efforts: 1992-1995
  - Office of Research and Development Program on Instabil~~ty: 1992-Prese~~nt
  - Army Research Institute Sponsored Research on Army C2 in Selected Operations: 1980s and 1990s

- ACTIS/NDU (Advanced Concepts, Technologies, and Information Strategies) Workshop Series on Coalition Operations
  - How Are Peace Operations Different?
  - Designing JTFs for Peace Operations
  - Latin American Perspectives on Peace Operations
  - Technologies and OOTW
  - Haiti: Lessons Learned in C3I and Inter-Agency Cooperation
  - Somalia
  - NGO/PVO

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WHAT IS OOTW?

- This topic is treated here only to clarify our remarks. It is also:
  - defined in official publications,
  - the primary focus of other presentations, and
  - a significant topic of discussion for the Workshop. ✓/2010
- For us, Operations Other than War are:
  - tasks assigned to the U.S. Military
  - for which warfighting is not the primary purpose.
- OOTW includes Missions
  - carried out in non-threatening environments such as disaster relief, humanitarian assistance, and environmental catastrophe response, and use of machines to monitor situations.
  - in which military forces supplement law enforcement in relatively low threat environments such as counter-drug programs and restoring civil order.
  - executed in environments where threat is real, but combat is not sought such as shows of force, unopposed evacuation, freedom of navigation operations, peace monitoring, or combatting terrorism.
  - under military threat where combat is a clear possibility or near certainty, such as peace enforcement, peace imposition, opposed evacuations, retaliatory actions, or pre-emptive raids.
- OOTW Are Almost Always Political-Military Missions
- Increasingly, OOTW is a Coalition Activity

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WHAT IS C3I IN OOTW?

- Military C3I leads and manages forces and systems, but is imbedded in a larger structure.

- A complex web of Command Arrangements surrounds and cuts across the military C3I system in OOTW:
  - In most cases the **U.S. Ambassador** leads the "country team."
  - Some **U.S. assets** (intelligence, SOF, etc.) are linked to, but not integrated with coalition C3I systems.
  - **Non-Defense agencies** coordinate with U.S. Military forces, but do not accept military directives.
  - **Foreign military forces** cooperating in a coalition typically have differing national manadates, and maintain independent communications and command arrangements with their governments.
  - **International organizations**, other **non-governmental organizations** (NGOs), and **private voluntary organizations** (PVOs) may have important information, provide important services related to mission accomplishment, and need/expect support (security, transportation, communications, information) from military forces, but will not accept military directives.
  - **Host governments** are outside the military C3I system and deal with it through a variety of formal and informal mechanisms, but do not accept military directives.
  - **Traditional leaders** (religious, clan, etc.) play an important role.
  - Finally, **conflict participants**, where relevant, will cooperate with or resist military directives based on complex, often dynamic relationships.

State Justice

Planning

Civ Mil Link

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KEYS TO UNDERSTANDING C3I IN OOTW

- Neither Command Arrangements nor formal C3I systems are likely to follow doctrine.
- Decision Making in OOTW is Complex, not Simple
- C3I and other Decision Making Will be More Decentralized
- OOTW C3I and other Decision Making Cycles Will be Slower Than Warfighting C3I
- Decision Support Requirements Extend Far Beyond Military Matters
- Adaptive Control is the Limit of Planning Quality in Most OOTW, Reactive Decision Making will Dominate Unless Contingency Planning is Adopted

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Neither Command Arrangements Nor Formal C3I Systems Are Likely To Follow Doctrine

- U.S. Doctrine Emphasizes simple hierarchies with appropriate recognition of national sovereignty

But we are moving toward distributed C&C

- In practice, however, very different structures predominate
  - Span of Control often exceeds reasonable guidelines
  - Strategic, operational and tactical levels become intermingled

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FIGURE 8. COMBINED STRUCTURE WITH NATIONAL INTEGRITY

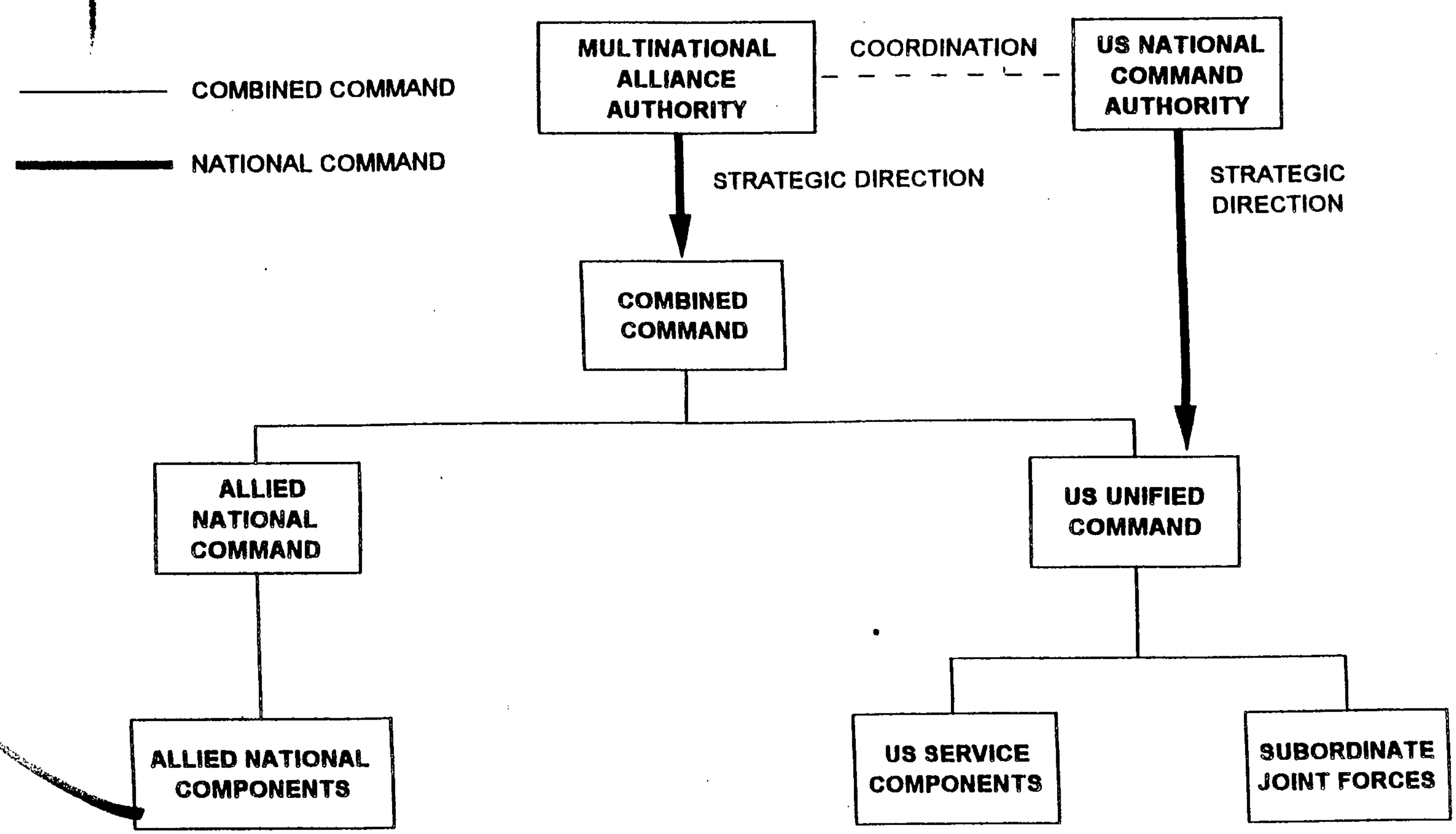

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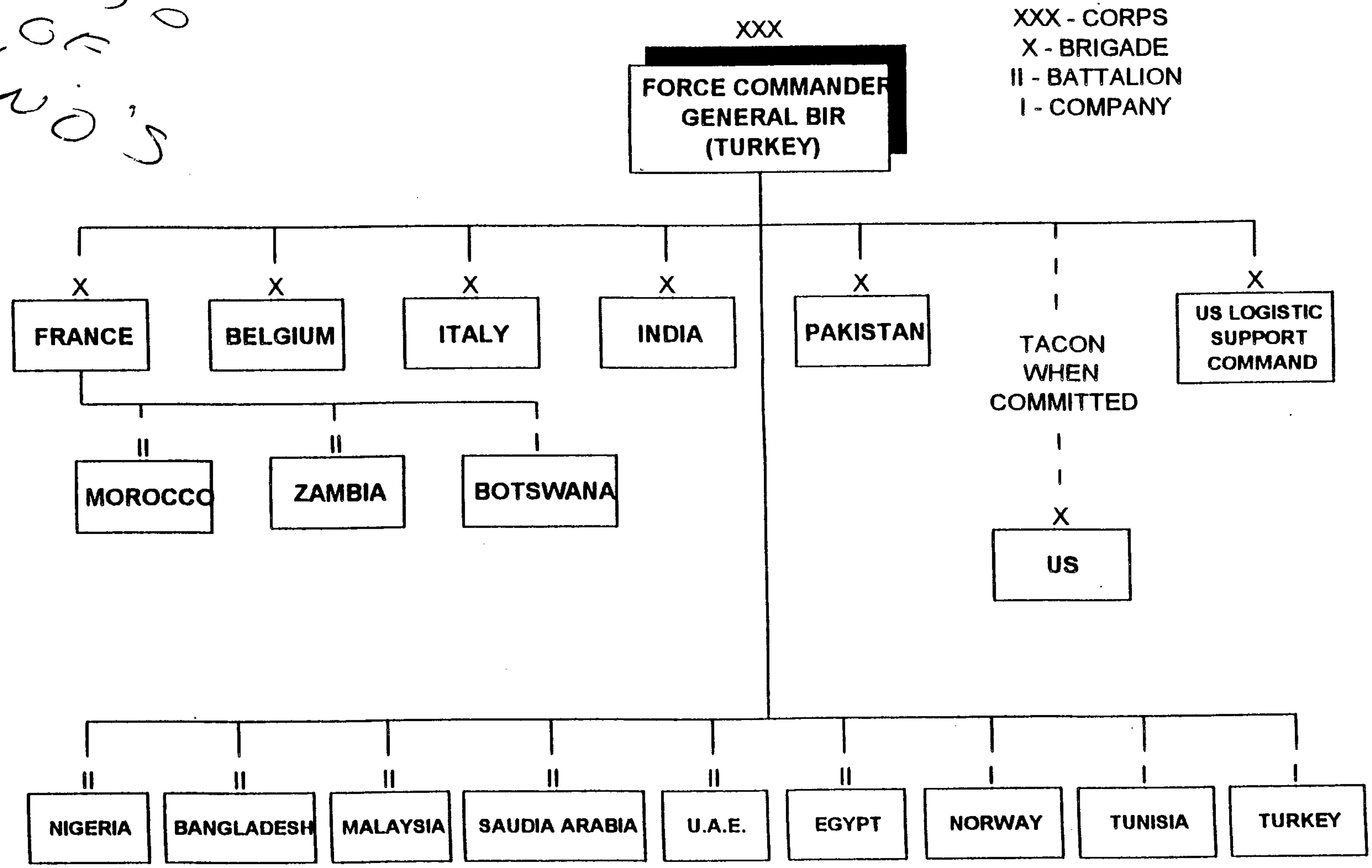
Figure 5.UNOSOM Command Relationships

USO OF LNO'S



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Decision Making in OOTW is Complex, Not Simple

- **Simple decisions** are those that involve selecting options from a preset menu.
  - Examples include sensor-to-shooter systems, planning for lift, and logistics support.
  - Simple decisions can be reduced to algorithms or rule based systems.

- **Complex decisions** are those for which the options must be created before a selection is possible.
  - Examples include course of action analysis above the tactical level and most SOF operations.
  - Complex decisions typically have no rule based solutions and involve strategies such as "satisficing" or "mini-max".

From understandings

- In well understood military knowledge domains (e.g. air to air engagements), complex decisions are often converted to simple ones through the use of doctrine, procedures, approved tactics, or "recognition-primed decision making".

- OOTW, because of **the dynamic situations**, the **number of relevant actors**, and the **predominance of political** over military factors, are dominated by complex decisions.
  - Complex decisions are required at very junior military levels.
  - Basic elements of military practice, such as rules of engagement (ROE), self-protection, and the principles of war (e.g. surprise, security and mass) become complex.
  - The consequences of poor decisions are unpredictable because they have potentially "chaotic" social and political consequences.

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C3I and Other Decision Making Will be More Decentralized

- A variety of actors participate.
  - Military organizations; usually a coalition, host, and often adversary
  - Civilian agencies: U.S., coalition partners, host, and often adversary
  - International organizations, NGOs, and PVOs
  - Often local or traditional (religious, tribe, clan, etc.) leadership
- Not all decisions are taken in the theater.
  - International mandates or negotiations may limit military activities.
  - Foreign military forces and agencies consult with home governments.
- Missions rarely involve imposition of U.S. will by force of arms except in narrowly defined contexts.
  - Cooperation within the coalition, across the range of actors, and with adversaries may be required for mission accomplishment.
  - Coalitions tend to be risk averse because of the range of interests they represent.

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OOTW C3I and Other Decision Making Cycles Will be Slower Than Warfighting C3I

- OOTW tends to occur in poorly understood situations: **unfamiliar geography, little studied adversaries**, and with some **novel coalition partners**.
  - These factors increase decision complexity.
  - More complex decisions require more time if risk is to be minimized.
  - Likely adversary courses of action and reactions to initiatives will slow decision making.
  - Communication among unfamiliar coalition partners will require more time. INTEROPERABILITY
- Decentralized decision making is inherently slower than centralized decision making.
  - Both geographic dispersion and the consultative process require time.
  - For complex decision making, broad consultation does decrease the likelihood of poor decisions (measured as choices leading to mission failure).

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THE CENTER FOR ADVANCED ACT CONCEPTS AND TECHNOLOGY

Decision Support Requirements Extend Far Beyond Military Matters

- Military C3I requires decision support in force related arenas:
  - Planning aids and mission rehearsal
  - Logistics planning, scheduling, and tracking
  - Intelligence
  - Weather

- OOTW missions require tools that assist deal with other key elements of the dynamic environment:
  - Political situations
  - Population movements (refugees)
  - Activities of non-military organizations and entities
  - Demands for resources (communications, lift, security) from outside the military.

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Adaptive Control is the Limit of Planning Quality in Most OOTW

- Military commands can control situations at five different levels:
  - **Reflexive Control**: Fully understood situation, "best" course of action (which takes advantage of the situation and the actions of adversaries) clearly identified and executed successfully.
  - **Adaptive Control**: Well understood situation with a small (3-7) possible futures for which lead indicators are available. Contingency plans and time to implement them exist, so the situation can be controlled, unacceptable outcomes avoided, and successful mission accomplishment is likely over time.
  - **Direct Control**: General understanding of the situation and how it can become dangerous. Options exist that can prevent unacceptable outcomes, but the circumstances under which mission accomplishment should be expected are not clear.
  - **Reactive Control**: Alternative futures are known, but no lead time indicators exist. Hence, adversaries have the initiative or circumstances beyond the control of the command are expected to determine the future and the command must respond after the fact.
  - **Trial and Error**: The current situation is unacceptable. The command must act, but the situation is poorly understood, so the results of the actions chosen cannot be forecast with confidence.

- Unless Contingency Planning is adopted, Reactive Control is likely to dominate.
  - Too much complexity for successful reflexive control.
  - Direct Control is too uncertain for coalitions to accept.

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CONCLUSIONS

- OOTW are qualitatively different from warfighting operations.
  - Fundamentally different missions or purposes dominated by political issues.
  - Dynamic, complex, environments often involving novel partners, unfamiliar terrain, and little studied adversaries.

- C3I in OOTW is profoundly different than in warfighting operations.
  - Dominated by complex decisions,
  - Embedded in command arrangements much more complex than C3I itself,
  - Characterized by slow, decentralized, risk averse decision cycles.

- Decision support must extend beyond military issues to include other domains that constrain or are impacted by military activities.

- Adaptive Control through timely contingency planning is the appropriate goal for decision making in OOTW.
  - Reflexive Control is a dangerous practice.
  - Direct Control will be rejected by coalitions.
  - Reactive Control will predominate unless contingency planning is adopted.

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Panel 4

Support for Coalition - How to Do It, What is Needed From DoD/Industry?

Moderator: Major Adrian Bogart, MDARNG

Featured Speakers:

"Managing Open Source Information in a SOF/Coalition Environment"
Mr. Ralph A. Lowenthal
Marine Corps Research Center

"The Use of Electric Performance Support Systems by Special Operations Forces in the Field"
Ms. Molly M. Kyne - Essex Corporation

"Coalition Doctrines for Peace Operations and Humanitarian Assistance"
Mr. James J. Landon
Evidence Based Research

"Guise vs. Gadgets; The Case for SOF Overwatch in Robot Assisted Reconnaissance"
Major John G. Blitch, USA
USSOCOM (SOJ7-CS)

MANAGING OPEN SOURCE INFORMATION IN A SOF/LIC ENVIRONMENT

Ralph A. Lowenthal

Abstract:

To successfully conduct joint and coalition operations in today's information environment, SOF leaders must be able to manage vast amounts of information. New uses of established resources will be found once the Internet is used to connect traditional sites of information--libraries--to the SOF commander in the field. Printed material, interviews with existing experts, and already compiled data can be placed in a real time manner for the SOF commander's use. The commander and his C4I team must be able to rapidly access, process, analyze, and distilling incoming information and then use the information to create a strategy that will guarantee success within the established rules of engagement.

In this paper, the author will show how the use of Open Source Information as found in research centers and academic libraries can be used to support a SOF/Collition Operation. By using a central point of collection and working with military personnel already in place (reservists and recruiters), a SOF planning team can harness a vast flood of information in the academic community and rapidly produce a product that can be used during a coalition operation. As information is gathered, it is sent via the Internet to the central collection point for processing. The processing will include running information through a standardized HTML (Hypertext Markup Language) script editor that will provide links for the SOF commander to use in exploring and finding more information as he needs it as opposed to taking what others give to him.

Introduction:

Open source intelligence is nothing new. The military, intelligence services, and business communities have used it for years. History is replete with illustrations, case studies and stories recounting the use of unclassified information in the execution of operations: the use of tourist guides and maps to plan invasions, reading the opponents newspapers to gauge will and morale of the people, and the acquisition of technical journals and scientific papers to assess industrial and technological capabilities. What is different now is the enormous amount of information available and how quickly it can be gather and disseminated. The author of this paper does not intend to recount the current growth and development of open source information in this paper. Much can be found by consulting Robert Steele's *Open Source Handbook* or by reacting various articles or papers found both on the Internet and within military journals and publications. Rather, the author suggests that while the theory of accessing Open Source Information is sound, there has yet to be anything said about how the warfighter, or in this case the SO/LIC commander, gains ready access to the information at the point of need.

Accessing Information:

By it's very nature, today's warfare is found where it is least expected. Enemies, and allies are not always realized in advance. The Special Operations or Expeditionary Unit commander may not know who or what he will encounter until he is onsite. Often the commander is required to carry out operations that are not supported by preplanned intelligence packages. The commander is asked to plan an operation, contact allies, and set up joint or coalition headquarters with a minimum of intelligence information. However, the Special Operations/Expeditionary Unit commander's communications suite is capable of handling large amounts of data and his command and control network can process and assimilate the same data to his subordinate commands.

Ideally then, the commander should be given access to the resources of the Internet. There he may find a wealth of information concerning the area of operations, his allies, and his opponents. In addition, he can gauge public reaction--at home and abroad--to his operations, and when necessary he can act swiftly to avoid incidents that could damage his operations and still successful complete his mission. How does the commander gain access to the resources of the Internet? If he does not have the time to conduct research, and/or his planning staff is small and already overtasked, who will find the required information? What the commander needs is a process that supplies information on request. The process should require minimal overhead or cost, and use manpower and personnel resources that already existing. It must also be available on demand. It must be able to take advantage of established resources already found on the Internet--research centers and academic libraries, and it must be flexible enough to change as the needs of the commander change.

By using a central point of collection, for example a Command and Staff College and its adjoining research library, and working with military personnel already in place (reservists and recruiters), the information gathering and dissemination process can be kept low cost without jeopardizing quality. The librarians and researchers associated with the Command and Staff College library already have the training needed to conduct searches in a vast number of printed and electronic resources. The same individuals are also familiar with the terms and jargon used by military personnel. The combination of research skills, military knowledge, and training in interviewing techniques will ensure that a Special Operations/Expeditionary Unit planning team will be able to harness the flood of information found within the academic community. The librarians and researchers will also be responsible for creating and maintaining a dedicated Home Page on the World Wide Web (WWW) that will be available to the commander and his staff in the field.

To gain access to relevant information in the academic community, the team of researchers and librarians will first identify unique sites of information. Once the sites are selected, nearby reservists and recruiters can be dispatched to find relevant information. The reservists and recruiters who will perform this part of the operation will have received

training previously as part their normal duties. Using laptop computers and portable scanning devices, they will be able to quickly find and digitize maps, relevant periodical articles, and sections of books. Additionally, they may conduct interviews with members of the academic community. These interviews can then be transcribed and added to the information sent back to the central point of collection. There the librarians and researcher will collate the information, converting it into HTML (Hypertext Markup Language) script where needed, and making it available to the commander in the field as it is produced.

At this point, one of the true strength of the Internet and its applications is demonstrated--that is the ability to quickly consolidate information from a variety of formats and sites and make it useable almost immediately. The HTML script editor mentioned previously is a powerful and easy tool to use and manipulate. A number of commercially developed editors are already available, and many librarians and researchers affiliated with military academic institutions are already trained to use them. In the proper hands, a WWW Home Page can be made available to the commander during his planning phase, and be kept constantly updated by both the collection and dissemination site in the States and by the commander and his C4I team in the field.

As the operation continues, data and information from the field will be added to the Home Page. The information on the Home Page can be made accessible to as many or to as few people as desired. Policy makers and briefers may find the information contained on the Home Page useful, and additional copies or editions of the original Home Page maybe created for general use. Once the operation is completed, the Home Page may either be removed or left available to the public as a record and history of the operation.

Conclusion:

The resources of the Internet can thus become another tool in both the planning process and the actual operation. Used both to gain information and to achieve success, the Internet in the hands of the modern Special Operations/Expeditionary Unit commander is truly a force multiplier and enhancer.

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The Use of an Electronic Performance Support System by Special Operations Forces in the Field

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Abstract— The role of the Army Special Operations Forces (ARSOF) in Humanitarian Demining is to establish demining operations in selected countries that can be sustained by the Host Nation (HN). The Demining Support System (DSS) is an advanced multimedia/presentation technology being used to improve the demining and mine awareness capabilities during Operations Other than War. The DSS is a completely modular, rugged, and shippable unit that provides multimedia and multilingual modules for demining and medical training, access to a database of world land mines and demining equipment operation and maintenance, development of mine awareness materials directly related to the local threat, and templates for mission planning.

INTRODUCTION

The Demining Support System (DSS) is an electronic performance support tool designed to facilitate the deployment and success of Special Operations Forces conducting humanitarian demining missions. The Special Forces Operational Detachment (SFODA) must complete an intensive training mission and support demining and mine awareness activities by establishing a Host Nation (HN) mine clearance training company capable of providing continuous training of HN forces over the long term. Additionally, the SFODA is responsible for supervising the HN cadre in training the operational demining platoons and monitoring the operational platoons in conducting day-to-day operations.

Currently there is a major international thrust to develop demining equipment and techniques capable of augmenting the demining effort. To support this effort, the Night Vision and Electronic Sensors Directorate at Ft. Belvoir has developed over 30 items to assist in the mitigation of the landmine crisis. One of these initiatives is the DSS. The purpose of this paper is to describe the requirements of the SFODA and how the software modules and hardware components of the DSS support those requirements.

REQUIREMENTS

The goal for humanitarian demining missions is to establish demining operations that can be sustained by selected host nations. The objectives for the missions vary according to the Commander-in-Chief (CINC). For instance, the United States European Command had the following objectives:

- to reduce the proliferation and indiscriminate use of landmines,
- to increase mine awareness in the Area of Responsibility (AOR),
- to assist indigenous populations to cope with the landmine problem, and

- to provide knowledge to create and sustain an autonomous host nation demining program.

The United States Pacific Command was interested in creating a program whose responsibilities could be assumed by the Cambodians themselves. The United States Central Command sought to:

- reduce casualties caused by uncontrolled mines,
- return mined areas to productive use,
- create a self-sufficient, indigenous demining infrastructure, and
- put an effective public awareness campaign in place. [1]

The amount of effort needed to make a demining program successful is dependent on the nature of the in-country situation, which varies from nation to nation, and from locale to locale. To assess the situation, a pre-deployment site survey (PDSS) of the country is conducted prior to SFODA deployment. However, the survey is often conducted by someone who is not a member of the SFODA or who is a member of the SFODA, but is not aware of how the information will be used in the planning process. Consequently, the right kind of information may not be gathered.

Based on the pre-deployment assessment, the SFODA determines HN personnel abilities, logistical and maintenance support capabilities, and formulates the training and load plan. Often, when the team arrives in country it discovers that the initial PDSS was inaccurate. In this case, the team must improvise in a nation whose infrastructure is compromised and resources are few. The DSS must support improvisation.

In order for a demining program to be successful, it must meet the requirements of the host nation. However, certain tasks must be completed in order to reduce the HN's landmine problem and restore mined areas to their original peacetime conditions. Minefields must be surveyed, priorities determined, landmines cleared, the public informed, and the operation managed.

For demining, the consequences of inadequate performance are critical. Therefore, the training must be thorough, accurate, and valid. In keeping with the train-the-trainer tradition, it is important that the demining techniques and procedures maintain consistency as they are turned over to the HN trainer.

When the SFODA arrive in country their job is to turn a large group of inexperienced people into a cadre of deminers, trainers, leaders, and decision makers capable of carrying on a successful and long term demining program. The challenge lies in the fact that HN personnel speak a different language, have little or no education, live in a foreign culture with customs different from the SFODA, have few resources, and their country's infrastructure has been weakened by years of strife.

SO/LICs intention was to integrate computer-off-the-shelf technology into a system that would support humanitarian demining operations. In order to meet this requirement an electronic performance support system was designed to:

- minimize the amount of time for pre-mission train-up,
- minimize the amount of time spent in country by SFODA,
- leave behind expertise until it can be achieved by HN personnel, and
- increase the safety of in-country training.

The goal of the DSS is to provide whatever training and information is necessary to generate performance and learning at the moment of need. In the next section is a description of how that was achieved.

DEMINING SUPPORT SYSTEM

To address the flexibility and training consistency needs identified in the requirements analysis phase of system development, an electronic performance support system was designed that is capable of:

- providing information at the moment of need,
- modeling, structuring, and implementing support electronically,
- making the training universally and consistently available on demand anytime, anyplace, regardless of the situation,
- conveying the message in the presentation mode best suited to the target audience, and
- offering an integrated package of previously independent resources. [2]

HARDWARE

The DSS is designed to be shipped to the HN and utilized by the SFODA. The DSS is made up of four ruggedized shipping cases. Two cases, the multimedia case and the monitor case, make up the system workstation. One case contains a poster printer and the other contains a heat press.

The system workstation is assembled by lifting the monitor case on top of the multimedia case and fastening them. When assembled, the workstation is approximately 5.5 feet tall, 25 inches wide, and 27 inches deep. The monitor and dual speakers are

embedded in the top case. The bottom case contains the following components:

- Pentium Laptop Personal Computer
- Mouse
- External Hard Disk Drive
- Portable Color Printer
- Color Scanner
- Color Digital Camera
- Power Conditioner

The poster printer case is approximately 4.5 feet wide, 21 inches high, and 18 inches deep. The heat press case is approximately 30 inches wide, 25 inches high, and 21 inches deep. (See Figure 1. Demining Support System.)

Figure 1. Demining Support System

The DSS operates on 110-120 volts AC, and 50-60 HZ power supply. Where this power supply is not available, appropriate power plug adapters supplied with the system may be used. A reliable power source is not supplied with the DSS.

SOFTWARE

The design of the DSS was derived from data obtained through interviews with mission planners, trainers, medics, and a review of field manuals and after action reports. The utilization of a multimedia platform provides the trainer the ability to give customized and just-in-time training for diverse target audiences and locations.

The demining support program is operated from a touchscreen monitor and contains six program modules. A brief explanation of each module is provided next.

Mission Planning

This module provides access to materials required for the planning and execution of a humanitarian demining mission, including references to after action reports, Explosive Ordnance Disposal schools, and training aids, templates for reports, programs of instruction, and an equipment planning guide.

Demining Training

This module provides lesson plans, video training procedures, training aids, and practical exercise cards for conducting demining training.

Medical

This module has Combat Lifesaver Courses 824 and 825 in English and in Serbian, training aids, go/no go cards, and video training for treating leg and arm, eye, and face injuries sustained by landmine detonation. It also contains current literature on topics related to landmine injuries.

Mine Awareness

This module provides a module for making posters, handouts, cloth transfers, and stickers. It also has a folder of mine awareness materials and a Mine Awareness Program Guide for Cambodia.

MineFacts Database

This module runs MINEFACTS, a database of over 700 landmines.

Electronic Library

This module contains operations and maintenance information on selected demining equipment

SUPPORTABILITY

The concept of the DSS is sound. An instructional systems design methodology was used to develop the content of the modules. The choice of hardware peripherals came from the SFODA's need to:

- edit and print lesson plans and field evaluation cards,
- choose graphics from the MINEFACTS, mine awareness, and training databases,
- design complex training and mine awareness graphics using a paint program, scanner, or digital camera,
- print graphics in poster, handout, sticker, or cloth transfer format,
- play multilingual instructional materials in audio and video modes, and
- operate and maintain complex demining equipment.

The high technological design does not preclude implementing low tech training materials (the common use of posters versus the use of multimedia video training).

The DSS is currently being deployed with the SFODA and a test plan for maintaining the system will need to be implemented.

CONCLUSION

Using a multimedia, electronic performance support system offers the trainer the ability to customize or tailor products and services to meet the needs of the trainee. With adequate and comprehensive training, the integrated package of otherwise independent resources can be left behind and used by HN personnel. Even though the HN personnel are instructed on how to provide training, they will need to develop their expertise. The DSS supplies this expertise while it is being achieved in country.

Currently, the DSS is being deployed with SFODA and the testing phase is not complete. As the system is used and changes are recommended and as new versions of hardware are developed, enhancements to the system can only result in a smaller system, with larger capacity for content and functionality.

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National Doctrines for Peace and Humanitarian Assistance Operations: Implications for SOF Coalition Support

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> "The range of capabilities, size, and strategic reach of SOF today are unmatched anywhere in the world and offer the Nation unparalleled capabilities to influence the international security environment.... [We] have moved beyond the Cold War into a new environment in which we may not have all the answers but in which we possess unique and valuable capabilities."
>
> General Wayne A. Downing, CINCSOC

The end of the Cold War has ushered in an entirely new era of collective security. As tensions have receded along Europe's East-West borders, there has developed both within national command authorities and the international community a renewed willingness and proclivity to undertake Operations Other Than War (OOTW) to promote peace and stability. Prior to *Operation Desert Storm*, coalitions were primarily viewed as a means of maintaining regional balances of power. Since then, the international community has come to regard coalitions as the paradigm in responding to world problems.[1]

The problem this paradigm shift presents is that some nations have grown comfortable with traditional peacekeeping doctrine, emphasizing low force levels, restrictive rules of engagement, use of force only in self-defense, compromise, and impartiality. Peace and humanitarian assistance operations, however, as exemplified in Somalia and Bosnia, have moved far beyond traditional concepts of peacekeeping to something short of a "Chapter VII" response.[2] Unified actions in these situations require military forces to coordinate efforts at the operational and tactical levels with both coalition military, governmental, and non-governmental agencies. In many instances, relationships among joint and combined task forces and these agencies will be ill-defined until liaison is made. This is where Special Operations Forces (SOF) have and can play a vital role. This paper will briefly outline the divergent national doctrines of potential coalition partners in their approach to peacekeeping and humanitarian assistance operations, and discuss general implications this reality poses to the Special Operations community.

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[1] Thomas C. Linn, "The Cutting Edge of Unified Actions," *Joint Force Quarterly*, Winter 1993-1994, Number 3, 36.
[2] John O.B. Sewall, "Implications for U.N. Peacekeeping," *Joint Force Quarterly*, Winter 1993-1994, Number 3, 32.

Doctrinal Disparities—Illustrative Examples

The search for a common approach for the conduct of peacekeeping and humanitarian assistance operations within a coalition inevitably involves major problems, not least of which is the difficulty reconciling different historical attitudes of contributing nations toward these non-traditional operations. This divergence in national approaches is due in part to different nations being involved in different types of military commitments in the last 50 years, and in part to their different perspectives of their own national interests. Critical to the success of any coalition, however, is the understanding of these realities, and the use of that understanding to overcome obstacles to mission accomplishment.

Perspectives On Peacekeeping And Humanitarian Assistance Doctrine

Nordic Countries: In general, the Nordic countries' historical commitment toward peacekeeping and humanitarian assistance operations has been based on a desire to make positive contributions to global security. As small states located on the potentially vulnerable flank of Northern Europe, their perceived interest has been to participate in international organizations as a means of upholding the fundamental principles of international law and order. In a tactical application, Nordic approaches to these operations concentrate on liaison and negotiation skills rather than the use of force.

United Kingdom: British doctrine dictates that peacekeeping operations serve to create the conditions of stability from which other economic, diplomatic, and political initiatives could be brought to bear to bring about an overall solution. British publications stress the minimum use of force, the requirement of impartiality, and the overall subordination of military measures as a precondition for success through political and economic initiatives.

France: Modern French doctrine on peacekeeping and humanitarian assistance operations lies in the middle of the spectrum of intensity and involvement. Above all, French peacekeeping doctrine stresses the right to maintain a flexible approach toward the use of force, and stresses that the ability to change from a peacekeeping to a retaliation status must be maintained yet controlled. Most notably, French doctrine distinguishes between civil-military activities which support the military mission, and military-civil activities that lend direct assistance to civil organizations.

United States: The U.S. perspective on peacekeeping and humanitarian assistance operations is one of the more "high intensity" approaches. U.S. doctrine stresses the need to achieve decisive "victory" and the quick resolution of conflicts through the securing of popular support. Criticism of U.S. doctrine includes the belief that it lacks the subtly required for internal conflict and relies on an inexact and counterproductive use of force.

Russian Federation: Like most nations, Russia's peacekeeping and humanitarian assistance doctrine is a relatively recent development. The general concept of *Operatsi po Podderzhaniyu Mira* ("Operations to Maintain Peace") encompasses a much broader range of activities that include much of what the West would call peace enforcement or counter-insurgency operations. Low-Intensity Conflict Operations in Tajikistan, Moldova, Abkhazia, and Nagorno-Karabakh have all shaped Russian "peacekeeping" doctrine.

These disparities in national approaches to peacekeeping and humanitarian assistance operations inevitably lead to the requirement to "build" coalitions of willing, like minded participants. Military misfortunes in Lebanon in the 1980s and during the transition from UNITAF to UNOSOM II in Somalia highlight these difficulties, and epitomize the consequences of coordination failures.[3] These examples also remind one that the act of putting together a successful multinational peacekeeping or humanitarian assistance operation calls for intensive, interactive diplomacy at many levels, integrated military planning and training, and the development of agreed command and control arrangements.

Implications for SOF

The implications that these divergent national approaches present to SOF form a set of three interrelated, concentric circles. In the first circle is the implication that coalition peacekeeping and humanitarian assistance operations require extensive coordination to resolve doctrinal differences. Virtually by definition, an ad hoc coalition has no established organizational structure and will depend on a lead nation to provide command and control functions.[4] As the Gulf War, *Operation Restore Hope*, and the IFOR deployment to Bosnia confirm, liaison officers provide one of the most effective ways of coordinating coalition efforts. Nearly all U.S. partner forces in the above operations had American liaison officers drawn from SOF with them.[5] The officers were language qualified and served as communication links to coordinate not only with the military forces of diverse nations, but with governmental and non-governmental agencies as well.

SOF must therefore come to understand multinational approaches to peacekeeping and humanitarian assistance operations as a special form of cultural and linguistic diversity. In many respects analogous to SOF's Foreign Internal Defense mission, SOF peacekeeping and humanitarian assistance liaison activities must be tailored to reflect the uniqueness of each host nation.

Closely linked to the implication that doctrinal differences require close coordination is the second circle that implies that SOF has become the *de facto* force of choice. Since there is a historical precedence for SOF involvement in peacekeeping and humanitarian assistance operations, one naturally questions whether this is an appropriate role for such highly specialized forces.

On a theoretical basis, "Peacetime Engagement" is a prescription for applying political, economic, and other instruments of national power to promote regional stability, diminish

[3] Denis McLean, "Peace Operations and Common Sense," United States Institute of Peace, Washington, D.C., 1996, 7.
[4] Steven R. Rader, "The U.S. Military Role in a Multilateral Framework," *Peace Support Operations and the U.S. Military*,(Washington, D.C.: National Defense University Press), 1994, p.53.
[5] Terry J. Pudas, "Preparing Future Coalition Commanders," *Joint Force Quarterly*, Winter 1993-1994, Number 3, 42.

threats, and foster post-crisis recovery. Peacetime engagement concepts employ military forces, but not military force. The use of military forces for humanitarian purposes is a long-established tradition in all corners of the world,[6] and the use of U.S. military forces is no exception. Tucked behind the well-established SOF missions of direct action, unconventional warfare and strategic reconnaissance are a group of disparate missions under the innocuous term "collateral special operations activities." Included among these missions is the use of SOF in support of peacekeeping and humanitarian assistance operations.

SOF traditional mission training and equipment provide them with a unique capability for peacekeeping and humanitarian assistance operations. SOF can act as a force multiplier for conventional forces by synchronizing coalition operations or providing coalition support teams to allied contingents. SOF language capabilities help coalition members communicate with other contingents, and their organic communications systems make SOF ideal links between multinational participants.

In an average week, some two to three thousand SOF operators are deployed on 150 missions in 60-70 countries.[7] A snapshot of these deployments shows that although a "collateral special operations activity," SOF are well engaged in a variety of peacekeeping and humanitarian assistance - type activities:

- SOF medical personnel inoculated 60,000 people in Cameroon over a 10-day period during a meningitis epidemic.
- Russian speaking SOF facilitated safe passage for U.S. cargo aircraft delivering food and medicine within the former Soviet Union during *Operation Provide Hope.*
- SOF assisted thousands of Kurdish refugees along the Iraqi-Turkish border, where all but 3 of 250 children declared hopeless by local doctors were saved by SOF medics.
- Civil Affairs specialists entered Kuwait City on liberation day with local counterparts and directed deliveries of food, water, and medical supplies, then restored health and other public services.

Unlike other conventional force "collateral" duties that divert time and attention away from primary responsibilities, it has been shown that SOF ability and readiness to execute aspects of their primary missions improves[8] through participation in peacekeeping and humanitarian assistance operations.

Proceeding from the argument that doctrinal differences require close coordination, and that this endeavor can be properly and appropriately carried out by SOF, leads one to the third, outer circle. It is becoming increasingly accepted that Special Operations Forces can and do have a significant, perhaps even increasing, role to play in executing these types of missions. As a consequence, SOF are in demand in an unprecedented number of

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[6] Frederick C. Cuny, "Dilemmas of Military Involvement in Humanitarian Relief," *Soldiers, Peacekeepers and Disasters*, St. Martin's Press, New York, 1991, 52.
[7] General Wayne A. Downing, "Joint Special Operations in Peace and War," *Joint Forces Quarterly*, Summer 1995, Number 8, 23.
[8] John M. Collins, "Where are Special Operations Forces?," *Joint Forces Quarterly*, Autumn 1993, Number 2, 9.

situations, and the potential for over-committment is constant. This implies that SOF manpower, readiness training, force structure, and logistical support are able to respond to this commitment. On this point, the conclusion is less certain.

As a case in point, there is widespread belief throughout the SOF community that an undesirable balance exists between active and Reserve component Civil Affairs forces. Ninety-seven percent of Army Civil Affairs personnel are Reservist. The one active battalion is chronically under its authorized personnel strength of 212, but bears most of the operational load.[9] This is contrasted with the fact that many of the Civil Affairs skills needed to respond effectively to a complex humanitarian emergency—sanitation, transportation, utilities, etc.—reside with Reservists with similar civilian backgrounds. While beyond the scope of this paper, dilemmas such as these require resolution if Special Operations Forces continue to execute their collateral duties to the extent they have in the recent past.

Summary

The need for multinational forces to intercede in demanding situations to implement a peace agreement or to guarantee humanitarian aid will probably continue for the foreseeable future. Operations in the Persian Gulf, Somalia, and Bosnia have amply demonstrated the difficulty reconciling coalition peacekeeping and humanitarian assistance doctrine. Despite an outwardly common objective, national concepts of operation and mission interpretation—driven by national interests—have been the rule rather than the exception. While a common doctrine for coalition peacekeeping and humanitarian assistance operations is far over the horizon, understanding, accepting, and finding paths around the doctrinal differences as they exist today must be a first step. Language barriers, varied cultural backgrounds, and different military capabilities and training may detract from effective coordination with multinational partners. But SOF-unique capabilities in language and cross-cultural training, their regional orientation and forward deployment, and focus on small unit actions make them one of the principle forces of choice to complement and support multinational operations objectives.[10]

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[9] Ibid., 14.
[10] JP 3-05, *Joint Special Operations*, Chapter II, "Forces and Missions" and JP 3-07, *Joint Doctrine for Military Operations Other Than War*, Chapter IV.

GUISE VS. GADGETS: THE CASE FOR SOF OVERWATCH IN ROBOT ASSISTED RECONNAISSANCE

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13 Jan 1997

ABSTRACT

The dynamic nature of world events makes predicting the future for Special Operations Forces (SOF) an especially demanding and difficult endeavor to undertake. The task is further complicated by the increasingly accelerated rate at which both hostile and friendly technology continues to develop. The stunning advances which continue to occur in the field of Artificial Intelligence (A.I.) and Robotics dictate that a large family of unmanned reconnaissance systems is bound to reshape the nature of tactical and strategic intelligence collection for several decades to come. This article explores the future of SOF oriented remote reconnaissance in the context of an expanding overwatch role for robotic reconnaissance system employment. The paper starts with an industry survey of available platform prototypes, followed by a discussion of advantages realized through the employment of miniature robotic systems for generic reconnaissance activities. The discussion is further highlighted by a summary of the SOFROB project, which examined the deployment of several micro-rover prototypes by two SOF elements in an actual field exercise. The conclusion reached from this project, literature review, operational deployment, and personal experience is that small robotic platforms can greatly expand the efficiency of virtually any military reconnaissance activity while simultaneously reducing risk of compromise and injury. Current limitations in A.I. reasoning and machine perception, however, make such systems extremely vulnerable to enemy deception activities. Hence, SOF are projected in a critical overwatch role to improve collection accuracy, maintain system reliability, and ensure overall mission success.

INTRODUCTION

The current trend towards culturally sensitive and surgical activities in Operations Other Than War (OOTW) is bound to present a very demanding challenge to future for Special Operations Forces (SOF) in the years to come. The proliferation of advanced Weapons of Mass Destruction (WMD), emergence of information warfare, and an increasing differential in global economic wealth distribution all present extremely difficult and technically demanding problems for SOF. A variety of new technologies under development, however, will no doubt be called upon to assist SOF in meeting the high demands placed on them from strategic levels of importance. It is with this focus that we

regard one of these technologies, the development of semi-autonomous mobile robots, as a valuable tool which will assist SOF in a variety of complex and demanding future mission profiles. Before looking at SOF specific developments however, a base line perspective of mobile robot support to conventional forces is in order.

MILITARY ROBOTICS INDUSTRY SURVEY

A virtual plethora of mobile robot platform prototypes has been developed with military reconnaissance activities in mind. The vast majority of such systems strive to capitalize on traditional robot employment advantages such as immunity to fatigue and hazards, reduced life support requirements, and independence from emotional distraction (such as fear, compassion, etc.). Although fixed robot systems attempt to increase efficiency with more effective repeatability and reduced overhead costs, the general goal for mobile robot development was to remove humans from the necessity to operate in hazardous environments.

Robot developers world wide have developed some remarkable systems which perform simple and even moderately complex tasks with varying degrees of success. Some of the more notable military successes, however, were demonstrated in DARPA's UGV/DEMO II program. This very ambitious and well organized effort demonstrated a wide variety of fully and semi-autonomous technologies involving overland movement with obstacle avoidance, precision RSTA (Reconnaissance, Surveillance & Target Acquisition) with automated target recognition, and a variety of path planning capabilities.

Overall, the project was a huge success, and culminated with a series of impressive demonstrations held during the spring and early summer of 1996. Lockheed Martin's SSV, or Surrogate Semi-autonomous Vehicles ("semi-smart" HUMMVs) performed a variety of route reconnaissance tasks, and actually conducted an autonomous live fire RSTA mission with 4.2 inch mortars.

This vignette was followed by an equally impressive MOUT scenario involving multiple SSVs operating in conjunction with several smaller vehicles developed by Sandia National Labs for the UGV/JPO (Unmanned Ground Vehicle Joint Program Office) in Huntsville AL. These ATV sized systems were used to support an infantry assault force during an exercise held at Ft. Hood's MOUT training site, Elijah City. Several vehicles performed a variety of high risk reconnaissance tasks which reduced human exposure to hostile fire. The much smaller (desk sized, 600 lbs.) "Pointman" system, employed by the Army Engineer School, was also used to drag a "wounded" soldier out of a hostile fire zone, and clear booby traps attached to a barb wire obstacle.

Additional roles which were not demonstrated might involve PSYOP tasks which can divert attention away from critical, high risk aspects of friendly unit operations (such as crossing danger areas exposed to enemy fire or negotiating cease fire agreements). Potential also exists for providing actual cover and / or active assault distraction by outfitting mini rovers with ballistic shields, noisemakers, and variable lighting devices.

Another logical extension of unmanned vehicle development is concerned with the de-mining challenge. The UGV/JPO's Vehicle Tele-operation Capability (VTC) program can modify virtually any vehicle to be operated from a distant location. It allows a concealed and/or protected operator to drive a modified tank chassis, for example, through a mine field or down a sniper-threatened alleyway. A variety of such systems have been recently tested in Bosnia with great success.

MILITARY UGV SHORTCOMINGS

Projects such as those indicated above illustrate the enormous potential for unmanned assistance to ground forces across the spectrum of armed conflict - from large unit maneuver operations in open terrain to small unit actions in urban environments. Military employment of such large systems, however, creates some significant shortcomings which serve to motivate the development of other platforms with specialized capabilities.

One problem with these larger systems revolves around the relatively significant logistics support required to actually get them to a critical location in time for them to be of any significant value to a combat unit. Although mechanized units may be able to accommodate such requirements (especially with something along the lines of the VTC program), light forces may actually invoke more problems than they will solve with employment of these large or medium (ATV) sized vehicles. This is particularly true in a typical reconnaissance scenario where a particular element wants to gather information while minimizing the risk of detection.

Large platforms obviously possess a significant disadvantage here with an increased cross section and corresponding concealment difficulties. Their inherently overt presence will severely limit their ability to penetrate denied areas or even moderate vegetation without a high risk of detection. Although a variety of advanced sensing modalities may be employed to provide some standoff, such an employment scheme offers little improvement (if any) over humans equipped with the same sensors. In any case their large footprint makes them easy to track and follow back to the operator who employed them.

Such systems also offer very little hope of being self sufficient in terms of power requirements, ability to negotiate complex obstacles, or rapid extraction from a mired condition. Systems which are not easily man portable are very difficult to recover rapidly, and require an extensive destruction effort to avoid enemy re-use if captured. If such systems are equipped with advanced sensor suites or sophisticated control/navigation capabilities as indicated above (large platform => high payload capacity = more gadgets + increased cost), the risk of enemy capture and reverse engineering may threaten the typical "throwaway" advantage available with smaller unmanned systems.

Perhaps the most significant limitation of these larger systems, however, lies in the basic motivation for their development. Although removing humans from hazardous tasks is certainly a noble and worthwhile effort to pursue, the fact is that many of those same tasks

are simply too complex or intuition intensive for machines to perform effectively (Lewis, 1996). Bulky, noisy autonomous vehicles with an insignificant amount of self awareness simply don't belong in a reconnaissance scenario where stealth and efficiency are often derived directly from the intuitive decision of when to move, how fast, and for how long.

In any case, there are a lot of highly skilled folks who are feeding their children by taking risks and performing difficult tasks. Many combat soldiers prefer to see themselves in a somewhat heroic light while performing these tasks (even if many refuse to admit it). To project a machine as a needed gadget solely on the basis of human replacement risks the formation of a virulent resistance movement on the order of the Luddite effect (a massive worker's uprising against employment of the textile loom which occurred during the Industrial Revolution). Unmanned systems have a much higher chance of being accepted as a viable asset if they are designed to accomplish some task which a human is physically incapable of, or is not emotionally committed to (such as precisely lining up a 1mm pin in a hole 6000 times, or inspecting hundreds of rows of rusty barrels for leaks). This may be one of the reasons UAVs have become so popular while UGVs remain relatively immature with respect to military employment history.

MMRV ADVANTAGES

Relatively recent developments within robotics programs throughout NASA and the DOE have resulted in an expanded family of micro rover platforms which offer some worthwhile alternatives to the military UGV program. NASA's shift to "breadbox" sized rovers was primarily motivated as a cost saving venture in the face of rising launch payload costs (Lewis, 1996, Zubrin, 1996) in an effort to conduct extra-terrestrial reconnaissance "faster, better, cheaper" than ever before. The MMRV (Military Micro Robotic Vehicle) concept, provides DOD with many very significant advantages over simple cost saving.

The primary advantage gained with micro (breadbox / rucksack sized) systems can be seen through their increased capacity to penetrate denied areas. This is obviously a key distinction between MMRVs and typical military UGVs. The drastically reduced bulk of an MMRV platform can perform tasks which humans physically cannot: regardless of whether or not the operational environment itself is hazardous to people. Thus, MMRVs have immediate recognizable value even if their actual task performance in the area itself is below human adaptability and intuition standards. These systems can:

- penetrate areas which are too small for humans
- maneuver through conduits which are too twisted or convoluted for human anthropomorphic articulation characteristics [even if the conduit might be able to actually support human size limitations]
- operate in environments which are too unstable to support human bulk, mass, bio-processes (e.g. breathing), etc. => reduced interaction with environment

These characteristics are obviously of direct interest to virtually anyone who wants to gain access certain areas through small entry points. The technology transfer applications for

Urban Search and Rescue offer a case in point (Blitch, 1996). Such systems are particularly attractive for crisis site search activities because their low energy consumption and minimal logistics (transportation, recovery, maintenance, etc.) requirements make them almost entirely self sufficient.

But MMRVs also decrease the chance of detection while simultaneously expanding reconnaissance utility and coverage area as described above. Such characteristics provide strong motivation for SOF mission profiles which depend on surprise for the vast majority of their operations. MMRVs promote a decreased risk of detection because of their:

- reduced physical cross section
- reduced noise signature
- reduced heat signature (due to low power requirements)
- reduced bio signature (chemical exchange)

ENHANCED MISSION RELIABILITY THROUGH SOF OVERWATCH OF MMRVS

The most significant advantages obtained from MMRVs, however, are realized when they are directly associated with a SOF overwatch element and projected as a combined, yet multi-faceted reconnaissance asset. A typical mission profile would involve a SOF team which conducts infiltration and overland movement as normal, except that they carry one or more MMRVs as part of their mission specific equipment. Upon arrival in a particular target area, the MMRVs are re-assembled (assuming they were broken down to evenly distribute loads) and put through a series of typical functionality checks (again as per standard operating procedures for any SOF element). The MMRVs are then launched from any number of chosen hide sites in the vicinity of the target to perform the lions share of high risk activities while the SOF element(s) remain safely concealed from hostile patrols and security devices. SOF remain on site to receive and analyze information received from multiple MMRV sensor downlinks which they then consolidate and burst back to higher headquarters at scheduled intervals with LPI (Low Probability of Intercept) communications equipment.

At this point our "combined reconnaissance asset" has already enjoyed some significant advantages over other unmanned collection systems. First of all, the use of SOF infiltration techniques ensures that the gadgets themselves are not damaged on launch or harsh treatment from an unmanned delivery system. Secondly, the MMRVs are transported over difficult obstacles (such as rivers, cliffs, etc.) enroute to the target area by SOF operators, so they don't risk further damage or consume excess power just getting to the place they're needed. In this manner, ***the SOF overwatch technique ensures that critical intelligence collection technology actually arrives at the appropriate location in a reasonable amount of time in a healthy condition.*** This level of confidence is sorely lacking with many of the unaccompanied sensor employment schemes favored by sophisticated intelligence system developers who incur exorbitant R&D costs when trying to tackle such operational challenges.

Mission reliability is further enhanced, however, with the realization that ***MMRVs have a low probability of compromise in addition to the low probability of detection referred to above.*** Because of their small size and harmless appearance (assuming a reasonable camouflage pattern or deception scheme commensurate with indigenous culture), MMRVs may not necessarily be viewed as a hostile intelligence asset immediately upon their detection. Furthermore, their small size may allow them to escape down some narrow conduit prior to close examination by hostile security forces. Finally, their reduced mass and bulk affords them a relatively simple and expedient means of extraction via human recovery and backpack transport to an exfiltration site. Even if recovery becomes impractical due to enemy reaction or other mission specific parameters, MMRVs can be fitted with a variety of anti-handling devices which could ensure their complete, but low profile destruction (e.g. quiet & unobtrusive) upon imminent enemy capture. By comparison, the sheer bulk of unaccompanied UGVs make them very difficult to destroy completely and quietly. In the interest of simplicity, weight reduction, and OPSEC, MMRVs would most likely be deployed with a very limited on board storage capacity which is relatively easy to zeroize in the event of unauthorized tampering. The presence of local SOF elements which act as downlink hosts, precludes the need for any delayed data compilation which may remain latent (and thus recoverable) if a larger system experiences a catastrophic failure (e.g. hit by hostile fire or has a major collision / accident during movement). In any case, MMRV assisted operations present a certain degree of deniability through their inherently harmless appearance (no weapons mounting capacity for enemy propaganda exploitation), and lack of human capture / interrogation potential.

As with any high risk strategic activities, special operations demand that significant consideration be given to contingency planning. What happens when the MMRV gets stuck, or runs out of power, or is headed for an unanticipated enemy patrol? Unaccompanied reconnaissance schemes are particularly vulnerable in such situations, because even the most advanced A.I. techniques cannot impart any significant level of situational awareness to machines.

The first issue here is fault detection, or realizing that something is wrong. We humans simply don't give ourselves enough credit for the tactile senses which compensate for the lack of eyes in the back of our heads, or the general "feelings" which let us know we're sick. Machines which can actually view or sense the entire surface of their own "skin" are extremely rare and virtually unheard of in the mobile robot community. Some advanced multi-agent proponents might advocate the use of multiple systems with collaborative inspection capabilities to achieve some sort of a group oriented awareness level. But this sort of a scheme would probably have the machines spending more time looking at each other than performing any worthwhile task. Human overwatch elements would most likely be needed to cultivate a truly effective group oriented awareness level in the immediate future.

The second issue, of course, is fault isolation and identification of the cause. This is obviously much more difficult, but can be handled fairly easily with a variety of A.I.

oriented diagnostic routines and expert systems, provided that sufficient sensory input is still available.

The third and most important issue, however, is that of fault recovery and external influence awareness. In the unaccompanied UGV paradigm, fault recovery is quite difficult - especially if no other unmanned systems have been employed to achieve a collaborative effect. In such instances the mission is most likely a complete failure, with a compromising hulk of machinery left behind as a signature. With the SOF overwatch profile, however, you've got a skilled (and concealed) repairman waiting in the vicinity who may be able to expose himself for the short amount of time necessary to either shove an MMRV over/around a confounding obstacle. or simply drag it back inside a bush for closer inspection or repair. The overall exposure level to the SOF operator is still significantly reduced since the vast majority of his time is spent in hiding. The MMRV's portability saves the mission because its reduced size allows it to be recovered, repaired or even replaced with a minimum amount of activity and effort.

Even if a reasonable level of situational awareness is achieved for use in future "super-smart" UGVs, however, machines will still lack the intuition which enables a skilled scout or pointman to anticipate enemy reactions or security patrol activity. Case based reasoning, neural networks, and a host of other advanced A.I. techniques are simply no match for the unpredictable nature of human behavior. Since it is relatively easy to fool a computer into thinking its doing the "right" thing, the likelihood that a captured UGV may be turned against its original operator or simply re-engineered for the task is also profound. Thus, the SOF overwatch factor provides a critical reliability dimension to overall chances for reconnaissance mission accomplishment in the presence of hostile enemy activity. These considerations must not be discarded in the interest of gadget intensive unaccompanied robot deployment; especially in high risk missions of strategic importance.

SOFROB PROJECT SUMMARY

The SOFROB project was graduate research project funded by the U.S. Army Artificial Intelligence center which explored the use of small micro rovers for a variety of robot assisted reconnaissance task in the USAR and military communities. It reflects the first actual employment of MMRV technologies in a full scale military exercise, and involved an actual HALO (High Altitude Low Opening) insertion of an MMRV prototype. The mission scenario was oriented on a hostile enemy airfield, with the intent to determine the specific type of ordinance attached to the wings of specific airframes. ***Because UAVs were not able to provide the "worm's eye view" necessary to achieve the critical "under wing" perspective, MMRVs employment was considered as a method to reduce risk of detection while providing access to key areas of interest (e.g. slip inside hangar doors, fuel dump, weapons storage area, etc.).*** Additional consideration of the UAV mission profile revealed other significant problems.

For one thing, their inherently overt collection presence would certainly have been noticed near an airfield which is designed and equipped to detect and control all types of aircraft. Secondly, a *UAV presence would most likely have been labeled immediately as a hostile collection effort since checking with local air traffic management is relatively easy from an airfield.* And thirdly, UAV(s) would not have been able to provide long term loiter time for extended surveillance without significantly increasing risk of detection: especially in the high wind conditions which often came up during optimum viewing periods.

This culmination FTX was tremendously successful in determining the value added to military reconnaissance through the employment of MMRVs. It also ***provided a wealth of technical design criteria for future prototype development based on direct input from multiple ground operators from different units.*** When combined with the entire industry survey and knowledge acquisition effort, SOFROB also uncovered a wide range of technology transfer issues for use of MMRVs in USAR (Urban Search and Rescue) efforts for earthquake and bombing response activities.

SOF AS A PREFERRED OVERWATCH ELEMENT

Much of the previous discussion illustrates the significant advantages which can be realized by any number of agencies which work in small units and seek reconnaissance assistance from MMRVs (hence the non-denomination MMRV label). Several key factors, however, make SOF a superb and uniquely suited host for MMRV employment.

As previously discussed, SOF typically seek advanced technology assistance to maintain surprise as they continue to operate vastly outnumbered in the face of tremendous odds against success. Thus the arrival of MMRVs with a capacity for Artificial Intelligence and semi- autonomous activity would not present a shocking paradigm shift to the degree it would in conventional ground unit. SOF typically rely on the physical maturity and technical competence of a very highly skilled workforce to ensure mission success. This also provides significant promise for an accelerated technical training process.

This experience level has also produced a SOF communications and support infrastructure which can handle the somewhat sophisticated downlink and consolidation data relay activities previously discussed. Furthermore, this infrastructure is relatively self sufficient, and designed with rapid deployment and crisis response in mind. SOF support units are capable of the long range clandestine deployment activities which may be necessary to resupply, repair and / or recover faulty unmanned reconnaissance systems.

SOF also bring a high level of cultural sensitivity to the operations arena, which will help avoid a host of deployment pitfalls which tend to plague gadget use in undeveloped areas of the world. Hence SOF operators and support personnel are uncommonly well suited to conduct the challenging yet highly lucrative reconnaissance activities described above.

CONCLUSIONS

The analysis presented above indicates that the SOF overwatch paradigm for MMRV employment undoubtedly represents the most promising concept for robot assisted reconnaissance available during the next decade and beyond. This model presents an almost perfect capabilities match up between mobile robots and SOF operators by complimenting each element's performance strengths and weaknesses. A similar relationship between long range UAVs which download ground sensor data from locally deployed MMRVs is worth pursuing as well. The call for human (SOF) overwatch, however, should not be interpreted as an effort to obstruct ongoing research which is required to overcome the situational awareness and mobility shortcomings of more autonomous systems. It simply reflects a common sense analysis of near term A.I. Robotics capabilities (e.g. within 3 years), and offers a mission employment concept which most effectively capitalizes on the significant advantages that mobile robot deployment brings to reconnaissance operations in general. Only by continuing to pursue a practical and ambitious relationship with such promising technological developments can SOF continue to remain relevant and effective in meeting the tremendous challenges which face our great nation in the years to come.

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Panel 4 - Support for Coalition Operations

Panel members opened individual discussions relating to technology and doctrine to support US and Coalition efforts in operations other than war, peacekeeping and humanitarian operations.

One technological capability presented using audio-visual equipment and computers to teach host nation forces techniques for detecting and marking mines. In effect, a Special Forces Operational Detachment A could deploy this unit system to a special operations area and "train the trainer" in dealing with the mine threat in their area. Another technology brought the unmanned ground vehicles to the battlefield to conduct a variety of roles to support coalition operations. Robotics with human oversight greatly lends the technological edge to the battlefield. Building on these types of technologies was the management of open source information from various sources to augment information management in the coalition environment, in effect a world-wide coalition internet. Another discussion rounded-out the entire Panel's discussion with the doctrinal necessities and considerations for multi-national force operations.

A conclusive remark comes with insight from a number of discussants, presenters and audience members which raises an idea that; core warfighting forces should reside with the Coalition Forces, yet combat, combat service and infrastructure support may reside with contractors who can; levy contractual international commercial arrangements to enable the Combined Force Commander with linguistic, construction, logistical and other non-military support to expeditiously conduct coalition operations with a smaller than usual military footprint.

American Defense
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Special Seminars

Panel 5

Humanitarian Operations - SOF's Role

Moderator: Lieutenant Colonel Mike Janay, USMC (Ret.)
AFM-USA, Inc.

Featured Speakers:

"Special Operations Forces (SOF) Support to Humanitarian Operations"
Captain William J. Bender, USA
USSOCOM (SOJ5-O)

"Same Country - Different Worlds"
Ms. Lisa Witzig Davidson
Evidence Based Research

"Cost and Effectiveness Modeling For Humanitarian Mine Clearing Operations"
Mr. Steven M. Buc
SAA International, Ltd.

"Demining Projects in the DoD"
Mr. Harry Hambrie
Humanitarian Demining Project Leader
US Army CECOM RDC

SPECIAL OPERATIONS FORCES SUPPORT TO HUMANITARIAN OPERATIONS

William Bender
Major, U.S. Army

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6 January 1997

ABSTRACT

Special operations forces are an effective tool to support geographic combatant commander's and ambassador's requirements for humanitarian operations. The complicated multinational and interagency environment of humanitarian operations demand sophisticated and nontraditional methods and procedures. SOF are well suited due to their inherent capabilities to operate in complex, unconventional, civil-military environments. However, the great number of actors in humanitarian operations leave a void in overall international command, control, strategy, and policy that complicate the effectiveness of humanitarian aid.

INTRODUCTION

Special Operations Forces (SOF) are an effective tool to support geographic CINC and ambassador's plans for humanitarian operations. While the majority of humanitarian operations are conducted by conventional forces, SOF serve an essential supporting role in augmenting conventional operations or conducting small scale unilateral missions. This paper will examine the role of SOF in humanitarian operations and examine some of the larger strategy and policy issues associated with humanitarian aid.

Humanitarian operations support both domestic and foreign requirements. The Department of Defense defines Humanitarian Assistance (HA) as "programs conducted to relieve or reduce the results of natural or manmade disasters or other endemic conditions such as human pain, disease, hunger, or privation that might present a serious threat to life or that can result in great damage to or loss of property." HA provided by US forces is generally limited in scope and duration and is designed to supplement or complement the efforts of host nation civil authorities with the primary responsibility for providing HA.

TWO TYPES OF HUMANITARIAN OPERATIONS

There are differences between normal peacetime HA and crisis response to complex humanitarian emergencies. Contingency operations respond to rapidly emerging natural or man-made crises. Deliberate operations are routine, planned events conducted as part of geographic CINC's peacetime engagement strategies. Contingency operations have several different characteristics

which distinguish them from deliberate peacetime engagement missions. These include command and control, planning process, political oversight and operations requirements.

Command and Control. Contingency operations require a high degree of involvement of the CINC staff. A crisis action team (CAT) is normally established at the geographic CINC headquarters and a joint task force (JTF) is formed to execute the humanitarian operation. Deliberate operations are a routine component of peacetime engagement strategies and are conducted through regular staff channels with a lesser degree of visibility. Authority is more decentralized than in contingency operations. The CINC provides forces to the ambassador while the executing unit operates under the theater established chain of command.

Planning Process. Contingency missions require rapid planning and execution. CINCs use preexisting functional plans as a framework and use contingency planning procedures to adapt the plan to the operation. Deliberate operations are planned up to five years in advance through the deliberate planning process.

Political Oversight. The NCA and senior policy makers are often involved in the approval and management of contingency operations to a much greater degree than deliberate missions. The "CNN factor" and rapid tempo of events in contingencies place high political attention to military actions. Deliberate operations are smaller in scale and their routine nature leads to less political attention and oversight.

Operations. Contingency missions are infrequent, medium sized operations that utilize non-routine JTF and CAT procedures for organizing and planning. Deliberate operations are frequent, small scale operations with normal, peacetime organization and planning procedures. SOF are involved in 30 to 50 contingency operations a year that normally involve battalion sized or larger forces. In deliberate operations, SOF participate in over 500 missions each year that involve less than 100 personnel (often less than 20).

MILITARY SUPPORT TO HUMANITARIAN OPERATIONS

US military humanitarian support varies within legislative constraints. The two major components of military humanitarian support are humanitarian assistance (HA) and humanitarian and civic assistance (HCA).

HA directly benefits the host nation government and its population. HA programs provide DOD excess property, transportation support, disaster relief and other support to assist civil authorities in providing assistance and basic services to the local populace. HA often serves as crisis response to disaster situations. DOD Directive 5100.46, "Foreign Disaster Relief", and 10 USC 2547 and 2551 provide guidance and legislative authority for HA.

HCA programs are authorized under 10 USC 401 funding to provide assistance to the HN populace in conjunction with a military exercise or operation. HCA provides a primary training benefit to US units and typically consist of engineer and medical projects. HCA provides an

incidental benefit to HN populations and may not be provided to HN military or paramilitary forces.

SOF ROLE

SOF can augment conventional forces or act unilaterally in both contingency and deliberate operations. Humanitarian assistance is not a SOF primary mission. However, the inherent skills and capabilities resident in SOF make them well suited to humanitarian operations. SOF can rapidly deploy small units to austere environments for extended periods of time. SOF are trained, manned and equipped for foreign internal defense, civil affairs and psychological operations. These missions provide SOF with regionally orientated, language qualified personnel who can use personal experience and links with host nation personnel developed in previous missions to enhance future operations.

There are constraints on SOF participation in humanitarian operations. SOF operations tempo has increased 151% since FY92. The current high tempo means that SOF availability is limited by other operational requirements. Since humanitarian assistance is a collateral activity, primary missions will have priority in allocating SOF.

HUMANITARIAN OPERATIONS CONCERNS

There are limits on the ultimate utility of humanitarian operations, regardless of whether the operation is contingency or deliberate. Humanitarian operations can alleviate suffering, but do not directly address the root causes of humanitarian distress. The natural causes of hurricanes and earthquakes are unavoidable. However, the man-made factors that contribute to most complex humanitarian emergencies include ongoing conflict and the incapacity of weak governments to provide for their populations.

Need for Long Term Strategy. By itself, humanitarian assistance exerts only marginal impact on the long term causes of poverty and conflict in the Third World. Emergency aid must be linked to economic and political development. There are currently no recognized international bodies capable of developing an integrated long term strategy or of controlling the actions of the thousands of actors in the international arena.[1] However, the increasing cooperation of the US with the UN, non-government organizations (NGOs), and other nations is leading to integrated, long term efforts at nation assistance. There is still room for improvement in developing integrated long term strategies. Organizational and procedural improvements by the USG and the international community can enhance efforts at conflict resolution and nation building.

Unintended Consequences. The focus on short term humanitarian relief can cause unintended long term instability in the target country. The international donors are constrained by the principle of sovereignty, which limits their ability to ensure appropriate use of donated

[1] Thomas G. Weiss and Kurt M. Campbell, "Military Humanitarianism" Survival, Vol. 33, No. 5, pp. 451-465. Pg. 456.

resources. An unprincipled government can divert or sell aid for revenue. The former government of Ethiopia greatly benefited from international aid for its famine, which was partly caused by government efforts to starve its insurgents. The government received revenue for use of ports, airfields, and transportation assets. The government formed a "wheat militia" where militia units were paid with bags of wheat to suppress the insurgent ethnic groups.

Aid can also extend the duration of a conflict. International assistance to refugees in third countries helps support a base where losers in internal conflict can reorganize to continue conflict. The recent fighting in Zaire is a direct cause of Hutu refugees in Zaire using the refugee camps to support conflict in Rwanda, Burundi, and Uganda. Polisario benefits from aid in supporting its war against Morocco, as do the various violent factions in the Palestinian refugee camps in the Mideast.

Coordination Problems. The aid industry has grown into a multibillion dollar industry. The growth of the industry has led to proliferation of aid agencies. The number of agencies registered with the Agency for International Development increased from 144 to 419 between 1982 and 1994.[2] The large number of actors in international aid with a wide variety of policies and agendas complicates any effort at integration. A particular problem for the military is that long term economic reconstruction and development involves international and nongovernment organizations. The military involvement is normally only during the humanitarian crisis while the nonstate actors stay for years. Coordinating strategy, policy, and transitions remains an unresolved issue.

The point is not that aid should not be given, but that more thought needs to be given to long term strategy and an integrated national approach to humanitarian assistance. Humanitarian aid has political implications, and to believe that aid can be given impartially is naive. The political impact of aid needs careful consideration in planning future missions.

DEMINING PROGRAM

The Humanitarian Demining Program is an example of effective use of SOF for humanitarian assistance.[3] The program provides instruction and training to other nations to protect the local population and to help clear land mines after local conflicts have ended. The demining program is a deliberate humanitarian operation, as opposed to the contingency type discussed earlier. The deliberate nature of demining allows time for detailed interagency and multinational coordination which enhances the leverage of the program.

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[2] David Rieff, "Charity on the Rampage", Foreign Affairs Vol. 76, No. 1, pp. 132-138. Pg. 133.

[3] See "Clearing the Way: US Special Operations Forces in the HumanitarianDemining of Afghanistan, Eritrea, and Ethiopia: 1988-1996", USSOCOM History and Research Office, 1996.

The demining program is an interagency approach to humanitarian assistance. The State Department requests assistance from the Interagency Working Group on Demining. ASD (SO/LIC) manages the program and the regional CINCs plan and conduct all approved missions. Funding is provided through Title 10, Section 401.

Small SOF units assist the host nation to develop long term, sustainable, indigenous programs coordinated with other UN, NGO or contractor programs. In 1995, 17 countries received US demining assistance. The strategic impact of the program is more than just lives saved. The program allows the host nation to rebuild their economy and for refugees to return to their homes. This builds public confidence in the host nation government and enhances internal and regional stability. For the United States, the program strengthens relations with the host nation at a critical time. The US gains increased contact and influence with the host nation to support democratization, and economic and infrastructure development.

CONCLUSIONS

International humanitarian assistance operations will continue to require military support over the next 5 to 15 years. The US military will not become a uniformed Peace Corps, but will maintain a focus on war fighting skills. Humanitarian aid will continue to be conducted as a collateral activity. Given this situation, what are the implications?

First, the international community will improve its ability to coordinate and integrate multilateral organizations. The US military now includes NGOs in training exercises. Efforts for enhanced coordination will occur from both the US military and the international aid community.

Second, the role for SOF remains crucial for coordinating US military support for humanitarian assistance. The military civil military operations center and the international aid community humanitarian operations center are efforts to form standard procedures for integrating operations. SOF capabilities, especially language skills, civil military training, and regional experience, contribute to coordinating the multinational military and nonmilitary organizations that operate in complex humanitarian emergencies.

Finally, contingency operations offer a tool to ameliorate human suffering, but are less efficient and effective than deliberate humanitarian aid. The rapid response requirements of contingencies complicates planning, coordination and costs. Deliberate operations, such as the demining program, allow for greater coordination with international and nongovernment organizations as well as the host nation. The potential for unintended consequences is consequently greater in contingency operations than in deliberate operations.

HUMANITARIAN DEMINING TECHNOLOGY DEVELOPMENT

IMPLEMENTING THE PRESIDENT'S DIRECTIVE

1. BACKGROUND: In 1995 congress mandated that the Department of Defense initiate a one-year research and development program to design, develop and evaluate new equipment(s) and technologies to increase safety and speed of remediating mine infested terrain. The Army's Communications and Electronic Command's Night Vision and Electronic Sensors Directorate located at Fort Belvoir, Virginia was tasked to undertake the program under the oversight of the Office of Assistant Secretary of Defense for Special Operations and Low Intensity Conflict(OASD SOLIC).

In 1995 29 separate projects were completed. They ranged from very complex sensor-fused remote-controlled sensor suites, to simple add-on paint sprayers for hand-held mine detectors.

In 1996 congress provided the Army a three million dollar plus-up to continue the program. During this period thirteen projects, which included follow-on development of high potential 1995 projects were optimized and evaluated.

The 1997 program has been funded at $14.2 million. The program's executors have developed a program oriented on solving demining technology problems relying heavily on "commercial off the shelf" (COTS) and leveraged military technology programs. High volume clearance technologies will receive priority in the 1997 program.

2. CURRENT STATUS: First...And most important, the Humanitarian Demining Technology Program is on-track. In 1995 the Government/Industry team performed a "mini-miracle" by evaluating and demonstrating 29 new items in less than one year. These items were initiated in late May, when the funds were received. Testing began in August and was completed on the last day of November 1995. All evaluations were analyzed and results reported on in January 1996. The DOD Project Sponsor - Office of Assistant Secretary of Defense for Special Operations and Low Intensity Conflict authorized disclosure of the Test Report in January 1996. The following schedule and information will be useful in understanding the program's accomplishments and goals:

- November 1994: NVESD tasked to develop demining equipment
- January 1995: NVESD hosts meeting of all DOD and other agency personnel involved in the SO/LIC (HRA) demining program. Demining equipment requirements were defined and prioritized. This meeting drove the NVESD research and development investment strategy.
- November 1994 - May 1995: Broad Agency Announcement and Internal R & D effort evaluations conducted. Contract packages and fund transfers[to other DOD elements] prepared and implemented.
- May 1995: $10M received. Contracts initiated within two months.

- June-July 1995: Preparations underway to represent US at UN International Meeting on Mine Removal in Geneva, July 1995. Minefacts CD ROMs introduced in Geneva by US Head of Delegation: Hon. Cyrus Vance. 500 copies of Minefacts distributed.
- August- November 1995: 29 humanitarian demining equipments and technologies evaluated at Fort A.P. Hill, Virginia.
- 29 November 1995: VIP Demonstration Day at A.P. Hill. Over 80 Pentagon, State Department and other agency representatives attended. Senior representative from SO/LIC was DASD (F & R).
- January 1996: Test Report published and distributed to SO/LIC.
- April 1996: "Bosnia file" mine data base distributed to IFOR units.
- May 1996: Video film of newly developed items distributed to SO/LIC to obtain approval for "common domain" status for distribution. Granted in May 1996.
- May 1996: Demining Workshop for DOD users to define 1997 program
- May 1996: FY97 - FY01 Program briefed to DDRE (Dr. Singley).
- June 1996: Program brief to DDRE and OSD PAE. Positive results
- June 1996: Program brief and demonstration to DUSD(ES), Ms. Sherri Goodman, Director, Tactical and Strategic Systems (Mr. George Schnieter) and OSD Deputy General Council for Environmental Security(Mr. Robert Taylor)
- July 1996: Participation in UN sponsored international conference on humanitarian demining, Copenhagen, Denmark.
- August/September 1996: Technology meetings at JASONs Summer Study and MIT meeting of humanitarian demining experts.
- November 1996: Mine Warfare Conference, Monterey, CA
- December 1996: King Publishing Company Humanitarian Demining Symposium, Alexandria, Virginia
- December 1996: Humanitarian Demining Display at Pentagon and briefings to Asst. Sec Def (SOLIC), PDUD(Policy) and Deputy Secretary of Defense
- January 1997: Interagency Working Group for Humanitarian Demining - Support to Bosnia-Herzegovina
- February 1997: 8th Annual SO/LIC Symposium and Exhibition,
- February 1997: Landmine Detection and Clearance Symposium, Canadian Embassy

3. <u>CRITICAL SUCCESS FACTORS</u>: The culmination of the 1995 and 1996 programs led to numerous high visibility successes. Among these success are items of equipment already deployed to support U.S. forces deployed in operations other than war (OOTW) missions.

- Mine Data Bases(CD ROM and floppy disks) deployed world-wide
- Mine Detecting Dogs: Deployed to Bosnia by OSD
- Mini-mine detectors deployed for evaluation and support of dog teams and SOF in Bosnia-Herzegovina
- Mine Awareness Mobile Trainer(Fly-away System) deployed to Laos to support demining mission

- On-going discussions with SO/LIC and Theater SOCs to deploy improved mini-flails for mission support and evaluation. Two prototype flails have been deployed by the Office of Special Technology to Bosnia in support of U.S. forces.

- In support of the U.S. Government's Bosnia-Herzegovina Humanitarian Demining Initiative, SO/LIC has directed the Demining Project Leader to prepare high potential demining prototypes for deployment to Bosnia-Herzegovina. Fifteen thousand pounds of equipment is being readied for shipment at this writing. LEXFOAM(liquid foam explosive), Mine-marking foam, Mobile Training Modules and Mini-flails will be transferred to the Department of State's Demining Contractor in February 1997 for test and evaluation under operational conditions.

- The first non-governmental organization(NGO) purchases of items developed and tested under this program are underway. LEXFOAM, marking foam and Air-Knives are being procured by an American NGO for use in Cambodia.

- The Official Office of The Secretary of Defense Humanitarian Demining Home Page was installed on the internet in 1996. (...WWW. Demining.BRTRC.COM)

5. PROCUREMENT: The equipment and technologies developed under the charter of this program in 1995 and 1996 have resulted in [only] prototypes for evaluation. Even so there are items developed which have demonstrated remarkable capability. The R & D project lead continues to refine these items, however we must undertake preparations to be able to acquire them, and provide sufficient data to allow demining related industry, non-governmental organizations and United Nations elements to procure them.

NVESD has published test reports of the 1995 program for unrestricted distribution. The document has been forwarded to Defense Technical Information Center for unlimited release for distribution in the public domain and entered in the SOLIC Humanitarian Demining Home Page.

Same Country -- Different Worlds: Roles, Functions, and Organizational Cultures of SOF and Non-Governmental Organizations in Complex Humanitarian Emergencies

by
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As the international community finds itself responding more frequently to complex humanitarian emergencies -- internal conflicts with large-scale displacements of people, mass famine, and fragile or failing economic, political, and social institutions -- Special Operations Forces (SOF) have come to play an increasingly critical role in the overall international response. But SOF intervention is often a very blunt instrument, and as such, can only achieve limited objectives. It is the non-governmental organizations (NGOs) who are frequently involved in a humanitarian crisis long before the military, and it is these organizations who often remain behind after SOF complete their specific mission and depart. To effectively engage NGOs as "implementing partners" in complex humanitarian emergencies (CHE), it becomes imperative for SOF to understand the diversity of NGO objectives, approaches to a problem, and organizational cultures.

NGOs and government agencies offer many different approaches to a conflict, ranging from humanitarian relief and emergency services, to conflict resolution, development assistance and infrastructure rebuilding. Although NGOs may arrive on the scene of a CHE with a sense of common mission, in reality they represent a great diversity of resources, objectives, commitments, and capabilities. For example, one humanitarian relief organization may seek to provide aid to those in the greatest need, guided by a policy of strict neutrality. This objective may contrast with the goals of a human rights organization that can only achieve its objectives if it becomes actively involved in advocating change in abusive situations. To effectively engage these organizations as "implementing partners" in a CHE, it becomes imperative for SOF to understand such distinctions.

In addition to differing goals and objectives, SOF should be aware of the organizational and cultural variances that distinguish NGOs, such as differing approaches to authority (hierarchical versus diffuse). Like organizational traits, cultural influences also will come into play. SOF will be interfacing not only with NGOs from "traditional" donor countries -- such as the United States, France, the United Kingdom, or Germany -- but also with regional or indigenous NGOs. Each of these organizations will mirror particular cultural approaches to communication, problem solving, and planning that are reflective of their cultural backgrounds. By identifying key cultural aspects about NGO organizations, SOF can better tailor their training, the content and delivery of communications, and approaches to operations to achieve the best results.

Roles, Functions, and Organizational Culture of Special Operations Forces

Roles and Functions. The use of military forces for humanitarian purposes is a long-established tradition in all corners of the world.[1] The use of US military forces is no exception. Tucked behind the well-established SOF missions of direct action, unconventional warfare, and strategic reconnaissance is a group of disparate missions under the innocuous term "collateral special operations activities." Included among these missions is the use of SOF in support of humanitarian assistance and disaster relief operations. Demonstrated on numerous occasions, SOF "non-collateral mission" training and equipment provide them with a unique capability for humanitarian assistance operations. Unlike other conventional force collateral duties which divert time and attention away from primary responsibilities, SOF ability and readiness to execute aspects of their primary missions improves.[2]

Lessons learned have demonstrated that critical to the success of humanitarian assistance operations is the ability to effectively coordinate military, NGO, multinational components, and donor agency operations. In perhaps their most natural role, SOF play an important liaison function in CHE, supporting the requirement to reduce conflict and build synergy. Their ability to operate in small units in remote locations without extensive logistical support, their language qualifications, and their specialized knowledge of geographic areas and foreign cultures make them particularly well suited for this role.

Organizational Culture. Culture -- those values and methods of operation which characterize an organization -- can be reflected in the way a group is constituted and operates. With hierarchical command structures, detailed planning systems, extensive personnel selection methods, and rigid regulations on behavior, military culture -- and to a greater extent SOF culture -- is everything NGO culture is not.

Special Operation Forces require certain qualities to function effectively in combat. They are trained to react quickly and to take immediate, positive action to solve any problem they encounter. Trained and selected to perform more traditional SOF missions, there is neither a developed or natural attitude of neutrality, nor an instinctive desire to negotiate resolutions to conflict.[3] While these deliberately developed attitudes support traditional SOF missions, they run counter to the cultural characteristics of most NGOs with whom SOF must work with during humanitarian assistance operations.

Although it has been readily accepted that both military and NGOs need to work together to bring about a successful response to a humanitarian crisis, an acceptance of each other's cultural differences has been less forthcoming. Differences in cultures and the biases that

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[1] Frederick C. Cuny, "Dilemmas of Military Involvement in Humanitarian Relief," *Soldiers, Peacekeepers and Disasters* (New York: St. Martin's Press, 1991), 52.
[2] John M. Collins, "Where are Special Operations Forces?", *Joint Forces Quarterly* (Autumn 1993), Number 2, 9.
[3] FM 100-20, "The Military Role in Stability and Support Operations," Chapter 2.

follow often prevent cooperation, trust, and coordination. From the SOF perspective, NGO culture should be viewed in very much the same light as any other foreign culture -- one that requires specialized study and understanding before effective interaction can be realized.

Table 1. Selected Organizational Characteristics of SOF and NGOs

Organizational Characteristic	Applies to SOF	Applies to NGOs
Organization Hierarchical	X	
Focus on Neutrality		X
Unique Organizational Structures		X
Command and Control Highly Organized	X	
Focus on Command Structures	X	
Ad Hoc Participation		X

The Next Layer Down – Examining the Cultural Backgrounds of Specific NGOs

In addition to the organizational differences between SOF and NGOs, cultural differences related to an organization's national composition can be important in helping or hindering communication between the two communities. The international sector within the business community, with its goal of producing and marketing across borders, is keenly aware of the issues of cross-cultural communication and understanding. The ideas outlined in business-related books written on this subject could be of value to both SOF and NGOs. The following table highlights key findings among three such authors, laying out various categories of analysis that can be used as tools to understand and effectively use the cultural dynamic.

Table 2. Selected Categories of Analysis for Cultural Dynamics[4]

Category of Cultural Trait	Question for Cultural Analysis
Communication Context	What amount of information must be explicitly transmitted to this NGO?
View of Time	Does this NGO's culture view time sequentially or simultaneously?
Flow of Information	How does the speed of transmission of information affect understanding? Does this culture favor free flowing dialogue or narrowly focused, controlled communication?
Acceptance of Hierarchy	Does this culture automatically accept hierarchical structures or prefer a more free-wheeling structure?
Avoidance of Uncertainty	How willing is this culture in dealing with strangers versus persons they know well?
View of Collectivism	Is this a culture that values collectivism or places more emphasis on individualism?
Communication of Emotion	To what degree does this culture show emotion in communication?
Role of Status	Does this culture assign status based on achievement or ascription (age, gender, social connections, etc.)?

[4] The ideas for this chart were taken from three authors: Edward T. Hall & Mildred R. Hall, *Understanding Cultural Differences* (Yarmouth, ME: Intercultural Press, 1990); Clarence J. Mann, *Social Process Analysis: A Practical Framework and Methods for Analyzing Social Change,* 1995; and Fons Trompenaars, *Riding the Waves of Culture: Understanding Diversity in Global Business* (New York: Irvin, 1994).

The concepts embodied in Table 2 are not new or unique, but do provide insights into how organizations from other cultures transmit, receive, and react to information. This type of cultural analysis also provides a foundation for understanding how an NGO with a particular cultural background may act in a situation and helps Americans tailor their actions accordingly. For example, if SOF are aware that one primary actor in a situation may be an international organization with a German national in charge of operations in country, certain actions or forms of communication should be adopted to ensure the most effective cooperative relationship possible. According to various studies, Germans place a high value on order, formality, detailed descriptions, and useful examples. Knowing such broad cultural traits will help SOF interact more effectively with specific individuals and organizations. Moreover, some foreign NGOs, such as *Medecins Sans Frontieres* or Oxfam, are frequently involved in CHEs. Given the high likelihood that SOF will interact with these foreign NGOs, it would be worthwhile to learn the cultural differences that help define their unique aspects given their specific cultural backgrounds. For example, in *Understanding Cultural Differences*, Edward and Mildred Hall point out that "In French meetings, the information flow is high, and one is expected to read other people's thoughts, intuit the state of their business, and even garner indirectly what government regulations are in the offing."[5] According to the Halls, a fixed agenda for a meeting – an absolute necessity from an American perspective – can be "an encumbrance, even an insult to one's intelligence."

Not only will SOF be interacting with internationally recognized NGOs, such as CARE, World Vision, or Catholic Relief Services, SOF also will need to work with indigenous NGOs. It is highly likely that development organizations will already be in place in the host country of a CHE before SOF arrive, many of which could be from the host country or from the region. Because SOF are usually trained in the language of the host country and are familiar with the foreign culture, their knowledge should provide these forces with the necessary tools to interact effectively with indigenous NGOs. The key, however, will be applying this information in an organizational context and not solely relating it to individuals.

Conclusions and Recommendations

If the last ten years are any indication, humanitarian operations will play a key role in defining the nation's military commitments. But participation in such operations must be consciously limited if a down-sized military is to keep its warfighting mission in focus. Military strategies that include an expeditious and cooperative hand-off to NGOs will be more vital than ever. Strengthening the relationship between the military and humanitarian relief organizations during complex humanitarian operations, therefore, is key to a successful transition, and begins with a clear understanding of one another's culture.[6]

Cultural understanding, as this paper outlines briefly, focuses on many levels. First, SOF must be cognizant of the differences in perception that the NGO organizational culture brings

[5] Hall & Hall, *Ibid*, p. 17.
[6] Guy C. Swan III, "Bridging the Nongovernmental Organization-Military Gap," *Military Review*, (September - October 1996).

to a CHE. Second, SOF must maximize their effectiveness in communicating with key foreign NGOs -- those that are frequently involved in CHEs -- and develop an understanding of these NGOs' cultural backgrounds, be they French, British, Japanese or other. Third, SOF should be aware that their training vis-à-vis host country language and culture will be useful when thinking about their interface with indigenous NGOs. Although these ideas, by themselves, will not create the bridge necessary to ensure effective SOF/NGO cooperation during CHEs, they will contribute substantially toward the goal.

COST AND EFFECTIVENESS MODELING FOR HUMANITARIAN MINE CLEARING OPERATIONS[1]

Presented at the
8th Annual Special Operatons/Low Intensity Conflict
(SO/LIC) Symposium and Exhibition

February 12, 1997

Presented by

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SAA International, Ltd.

[1]This presentation is based on research performed for the Defense Advanced Research Projects Agency and originally published under the following title:

Buc, Steven M. and Tillery, George C. *Cost and Effectiveness Analysis Modeling for Demining Operations*. System Planning Corporation, January 1996. AD-A303257.

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Appendices

I.
EXECUTIVE SUMMARY

A. Objectives and Deliverables

This study's objectives were to assess the cost and operational effectiveness of state-of-the-art and emerging demining technologies, and to quantify the remaining challenges and potential benefits of developing new technologies. Its goals were to: 1) understand current demining operations and techniques; 2) identify the key cost and operational parameters which affect demining; 3) model demining operations and quantify the current methods in terms of these parameters; and 4) using this modeling tool, identify shortcomings and project potential improvements which could be provided by various new systems and technologies.

B. Approach

A four step approach was applied to accomplish the objectives: 1) Define demining and its terminology by researching and interviewing those directly involved. 2) Based on these understandings, develop systems models of generic demining processes. 3) These demining processes then formed the basis for a computer model, which could rapidly vary parameters and trade off cost and effectiveness considerations. 4) Using this model, conduct a preliminary assessment to identify the greatest potential for cost savings and improved effectiveness, and identify what challenges remain to be addressed.

C. The Problem.

Figure 1, from Landmines: A Deadly Legacy, shows a map of the world overlaid with the global demining challenge and the various degrees of severity by country and region. It appears that the only regions which are totally immune from the landmine threat are North America and Australia. Western Europe still suffers from the legacy of the two World Wars, although at perhaps a trivial level compared to the other regions of the globe.

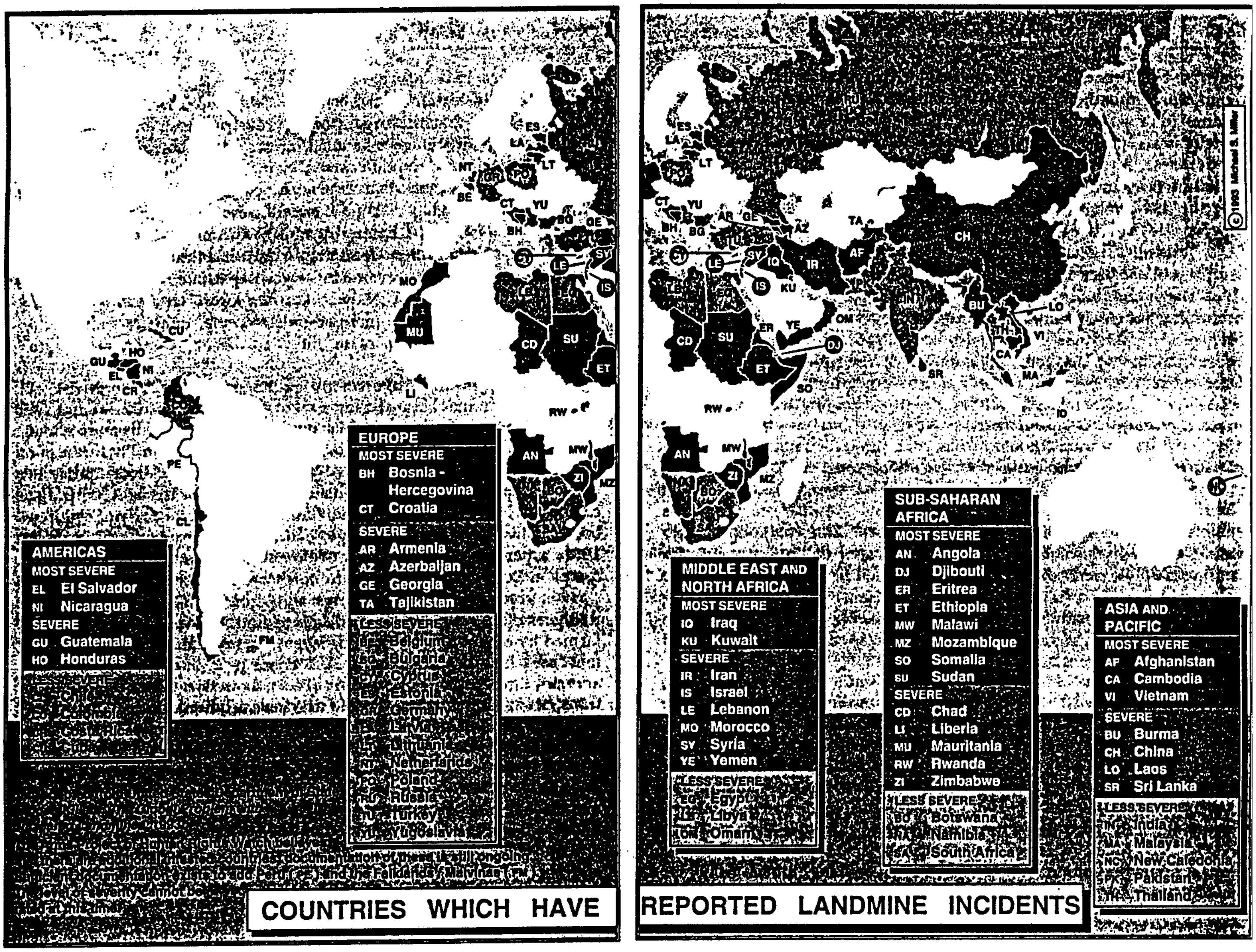


Figure 1
The Global Demining Challenge

The thirty-eight countries with severe and the most severe landmine problems are also suffering from severe economic and internal refuge problems, in part stemming from residual land mines which continue to deny the use of land and natural resources and terrorize those who dare to venture out from the limited safe havens. Neighboring countries and regions are also suffering economically from refugees displaced by these residual land mines and economic chaos.

The economic, social, and post-war conditions within these countries presents several challenges to the demining effort. In summary, these countries are poor and do not have sufficient resources to undertake demining projects or to maintain the necessary infrastructure to support demining. Knowledge of the precise location and numbers of residual landmines is not available, as evidenced by the many people who are killed or maimed each day by booby traps, landmines, and unexploded ordnance. As a result the demining process is labor intensive, expensive, and protracted, as every square foot of land must be checked for hidden dangers. Under these circumstances, some countries are estimated to require at least a century to clear.

D. Demining Technologies and Processes.

It must be realized that one demines a community, not simply a piece of land. The implications of this philosophy are far reaching in terms of the costs, technologies, and the schedule of a demining program. Communities comprise many specific locations: farms, roads, bridges, pasture, orchards, buildings, houses, water sources, and utilities. Therefore, the environmental disturbance or damage as a result of the clearance process should match the intended use of the specific location. This may dictate the use of different clearing processes and equipment which are most cost effective for a specific location. As examples, one may consider rolling roads, plowing farms, probing cemeteries, or employing bomb dogs to clear homes and buildings.

Some demining technologies may have more or less universal application in many specific locations, such as probes, metal detectors, and dogs. However, it is important not to destroy the long term usefulness of the location in an effort to make it mine free. For example, one should not plow or flail an orchard and kill all the trees in the name of demining efficiency. As a result, the most successful demining approaches have involved the most universally applicable and basic equipment and processes.

This study does not include an in-depth assessment of the cost effectiveness of using automated machinery or existing and developmental combat engineering equipment, which may be useful in counter-mine military operations. Combat engineering and earth moving equipment do not normally give high enough proof rates for demining. Comments made include: rollers do not conform to irregularities in the surface and therefore miss some mines; flails sometimes break the mines or push them deeper into the soil without detonation; and plows often push the mines aside without detonating them. These observations are more or less valid criticisms from a demining perspective. Nevertheless, a discussion of how heavy machinery and automated mine clearing processes could be adapted to a demining scenario is presented in the body of this report.

The technologies and processes for demining a community should address all of the components of a demining program: Survey - Detect - Verify - Neutralize - Rehabilitate. Surveying is the process of identifying and marking suspected mined areas for eventual clearing. Detecting is the process of entering a suspected minefield and precisely locating individual mines. Since some detection systems only indicate a suspected target, which could be either a mine or false alarm, each target must be verified. Following verification, some technique neutralize the hazard is then employed. Once the minefield is cleared of all targets, the location is then rehabilitated for its intended use. Special consideration of technologies should be made not only on their cost effectiveness face to face with the mines and UXO, but also on their training and maintenance requirements within the country in question, and their long term suitability for that country's demining infrastructure.

This study concentrated on evaluating the following currently employed surveying systems: 1) human intelligence or HUMINT; and 2) a system called MEDDS (Mecham Explosive and Drug Detection System), which employs dogs and a mine resistant vehicle for rapid area coverage. One emerging survey system was considered called ASTAMIDS (Airborne Standoff Mine Detection System), which employs a radar and infrared sensor system to identify both buried and surface placed mines and unexploded ordnance. In the cost and effectiveness analysis, each of these three survey approaches were used alone and in combination. HUMINT, MEDDS, and ASTAMIDS were each evaluated as a primary survey process. The combinations of HUMINT-MEDDS, HUMINT-ASTAMIDS, and MEDDS-ASTAMIDS were employed as supplemental surveys to see if overall effectiveness improved compared to using the primary process alone.

Detection, Verification, and Neutralization techniques evaluated were those currently employed in demining operations. Aspects of each of these three components of demining were incorporated into four basic clearance processes, representative of current demining operations: 1) probing alone, 2) metal detectors, 3) metal detectors and dogs, and 4) dogs and probing. Each of the six survey processes (primary and supplemental) were evaluated along with each of the four clearance processes for a total of twenty-four demining process evaluations. The processes were evaluated against a ten year demining program within a Mozambique scenario. Mozambique was selected as a candidate scenario because of its reported severe landmine problems and the availability of relevant information. A ten year demining program was established as a baseline from which to scale cost and effectiveness tradeoffs because current and planned demining programs are projected at increments of approximately ten years. Demining programs also require large up-front investments in equipment and training, the life-cycle costs for which should be amortized over a long duration project, such as ten years.

E. Modeling.

The computer model developed to evaluate the cost effectiveness of different processes and parameters comprises four modules: 1) Scenario Development, 2) Survey, 3) Clearance, and 4) Cost Analysis. This organization to the model is consistent with the community oriented demining philosophy and incorporates the distinct elements involved in a demining program. Within the scenario development, a distribution of landmine concentrations can be postulated, which may represented the likely situation with a particular country or region. Using a flexible scenario approach in the modeling permits the survey process to be fully challenged and evaluated from a cost and effectiveness perspective. Survey outputs include the distribution mines which were identified by the survey technique, and the amount of un-mined area which will also end up being cleared, due to errors in the survey process. The results of the survey, which are now scenario dependent, are then passed on to the clearance module. Each candidate clearance process is evaluated against the survey results to determine the level of clearance achieved. Finally, the cost module calculates the total cost and duration of all survey and clearance processes considered for that scenario, based on cost and level-of-effort (LOE) input parameters.

This model is sufficiently flexible and robust to permit a multitude of survey and clearance processes -- either existing, emerging, or postulated -- to be evaluated against real world demining scenarios. For this reason, this model is useful not only for achieving the

stated objectives of this study, but also as a planning and evaluation tool for ongoing and upcoming demining efforts.

F. Findings and Recommendations.

Tables 1 and 2 present the detailed results of the twenty-four survey-clearance combinations considered in this study, for a real world Mozambique scenario. This specific scenario considers that 1 million mines are present within the 39,350 square kilometers of inhabited area of that country, and that all terrain will be cleared within a 10 year program. In addition, 8% of the landmines will be plastic or low-metallic and, therefore, un-detectable by currently employed mine detectors. This aspect of the scenario serves to highlight the unique challenge facing deminers and the need for effective plastic and low metallic mine detectors. The input parameters supporting the survey and clearance processes are a compilation of best estimates, based on the research conducted during this study. The chosen output format is based on those items of information of most interest to the demining community.

TABLE 1A.
Demining Technology Analysis Results for a Mozambique Scenario: Process Costs

Sheet1

survey type	clearance type	detection probability	% mines surveyed	% cleared by detection	unmined area km2	survey cost $	clearance costs $	total costs $	survey $/km2	clearance $/km2	total cost/area $/km2	survey $ cost/mine	clearance $ cost/mine	total $ cost/mine
Humint			95.00		13,000	4.1 million			104			4.32		
	probing	0.999		94.9			71.3 billion	71.3 billion		1.81 million	1.81 million		75,132	75,136
	detectors	0.92		87.4			1.7 billion	1.70 billion		0.43 million	0.43 million		1,945	1,949
	dogs & detectors	0.95		90.2			875 million	879 million		22,000	22,100		1,001	1,006
	dogs & probing	0.95		90.2			4.03 billion	4.04 billion		0.102 million	0.102 million		4,610	4,624
MEDDS			99.99		6,215	75 million			1906			75		
	probing	0.999		99.9			34 billion	34.07 billion		0.86 million	.862 million		34,034	34,109
	detectors	0.92		92			859 million	934 million		22,000	24,000		934	1015
	dogs & detectors	0.95		95			453 million	528 million		12,000	14,000		477	556
	dogs & probing	0.95		95			2.04 billion	2.12 billion		54,040	56,212		2,148	2,232
airborne			99.5		1,391	3.6 million			91.5			3.6		
	probing	0.999		99.4			7.76 billion	7.764 billion		0.92 million	0.92 million		7,807	7,811
	detectors	0.92		91.5			264 million	268 million		7,000	7,100		289	293
	dogs & detectors	0.95		94.5			150 million	154 million		4,000	4,100		159	163
	dogs & probing	0.95		94.5			606 million	610 million		16,160	16,240		642	646
Humint-MEDDS			94.99		5,904	29 million			737			29		
	probing	0.999		94.9			32.5 billion	32.53 billion		0.83 million	0.831 million		34,247	34,278
	detectors	0.92		87.4			816 million	845 million		21,000	22,000		934	967
	dogs & detectors	0.95		90.2			431 million	460 million		11,000	12,000		478	510
	dogs & probing	0.95		90.2			1.94 billion	1.97 billion		49,500	51,400		2,152	2,184
Humint-airborne			94.92		459	5.3 million			135			5.3		
	probing	0.999		94.4			2.65 billion	2.655 billion		70,000	70,132		2,807	2,813
	detectors	0.92		87			145 million	150 million		4,000	4,100		167	172
	dogs & detectors	0.95		89.8			88.6 million	93.9 million		2,300	2,400		99	105
	dogs & probing	0.95		89.8			320 million	325 million		8,132	8,259		358	363
MEDDS-airborne			99.49		220	75.8 million			1926			75.8		
	probing	0.999		99.4			1.35 billion	1.42 billion		34,000	36,000		1,358	1,428
	detectors	0.92		91.5			120 million	196 million		3,000	5,000		131	214
	dogs & detectors	0.95		94.5			76.7 million	153 million		2,000	4,000		81	162
	dogs & probing	0.95		94.5			259 million	335 million		6,600	8,500		274	355

TABLE 1B.

Demining Technology Analysis Results for a Mozambique Scenario: Process Effectiveness

Sheet1

survey type	clearance type	detection probability	% mines surveyed	% cleared by detection	# people continuous LOE	#people continuous LOE	# systems continuous LOE	# systems continuous LOE	casualty probability (detection)	casualty probability (neutralization)	casualties people	casualties systems	undetected mines remaining
Humint			95.00		55		0						
	probing	0.999		94.9		1.011 million		0	0.001 prober	0.01	10,440	0	50,000
	detectors	0.92		87.4		22,330		0	0.004 detector	0.001	4,674	0	122,200
	dogs & detectors	0.95		90.2		11,024		848 dogs	0.00005 dog	0.001	4,654	48 dogs	94,152
	dogs & probing	0.95		90.2		54,080		2704 dogs	0.00005 dog	0.001	1,804	48 dogs	97,050
MEDDS			99.99		160		40						
	probing	0.999		99.9		484,632		0	0.001 prober	0.01	10,990	0	100
	detectors	0.92		92		11,209		0	0.004 detector	0.001	4,920	0	76,000
	dogs & detectors	0.95		95		5,538		426 dogs	0.00005 dog	0.001	4,900	50 dogs	46,000
	dogs & probing	0.95		95		27,040		1,352 dogs	0.00005 dog	0.001	1,900	50 dogs	49,000
airborne			99.5		4		1						
	probing	0.999		99.4		109,152		0	0.001 prober	0.01	10,935	0	5,000
	detectors	0.92		91.5		3,212		0	0.004 detector	0.001	4,895	0	81,020
	dogs & detectors	0.95		94.5		1,612		124 dogs	0.00005 dog	0.001	4,875	50 dogs	51,020
	dogs & probing	0.95		94.5		7,800		390 dogs	0.00005 dog	0.001	1,940	50 dogs	53,955
Humint-MEDDS			94.99		107		13						
	probing	0.999		94.9		458,739		0	0.001 prober	0.01	10,440	0	50,100
	detectors	0.92		87.4		10,659		0	0.004 detector	0.001	4,674	0	122,200
	dogs & detectors	0.95		90.2		5,226		402 dogs	0.00005 dog	0.001	4,655	47 dogs	94,200
	dogs & probing	0.95		90.2		25,840		1,292 dogs	0.00005 dog	0.001	1,805	47 dogs	97,050
Humint-airborne			94.92		59		1						
	probing	0.999		94.4		37,296		0	0.001 prober	0.01	10,390	0	50,800
	detectors	0.92		87		1,639		0	0.004 detector	0.001	4,667	0	126,203
	dogs & detectors	0.95		89.8		858		66 dogs	0.00005 dog	0.001	4,648	47 dogs	98,203
	dogs & probing	0.95		89.8		4,000		200 dogs	0.00005 dog	0.001	1,800	47 dogs	101,051
MEDDS-airborne			99.49		164		40 MEDDS+1 air.						
	probing	0.999		99.4		18,648		0	0.001 prober	0.01	10,935	0	5,100
	detectors	0.92		91.5		1,298		0	0.004 detector	0.001	4,895	0	81,020
	dogs & detectors	0.95		94.5		676		52 dogs	0.00005 dog	0.001	4,875	50 dogs	51,020
	dogs & probing	0.95		94.5		3,160		158 dogs	0.00005 dog	0.001	1,890	50 dogs	54,005

Based on these analysis results, several conclusions and recommendations can be identified:

Conclusions:

1. Significant demining cost reductions are achievable by employing more advanced survey technologies. This results primarily from the great reduction in un-mined area which must be checked for mines, due to survey inaccuracies.

2. Survey inaccuracies, even with detection rates in the mid to high 90th percentile, result in large numbers of remaining undetected landmines. Short of sending bomb dogs (MEDDS) throughout the entire inhabited country, most survey technologies fail to ensure very high clearance rates.

3. Probing alone effectively clears every mine and minefield identified by the country survey (99.9% proof rate), and if dogs (MEDDS) is used as the survey process, 99.9% of all mines will be cleared. However, this is achieved at an enormous human and financial cost.

4. If all mines were detectable my metal detectors, the dog-detector clearance process is the most cost effective technology for achieving nearly a 95% proof rate.

5. In the presence of plastic and low-metallic mines, the reliance on metal detectors presents a serious casualty risk. Under these circumstances, probing must be employed, with the resulting decrease in efficiency and increase in clearance costs. The dogs-probing process more than doubles costs over dogs-detectors when using the most efficient survey process (MEDDS-airborne). For other survey processes, clearance costs increase dramatically.

6. Supplemental surveys will not increase the number of mines detected by the survey. However, large clearance cost reductions are obtainable by using a supplemental survey, if leaving slightly more undetected and uncleared mines is acceptable.

7. Although survey costs are relatively small compared to clearance costs, the accuracy of the survey process has the greatest impact on total clearance costs. This tradeoff highlights the need of the survey process to minimize the amount of un-mined area that must be cleared due to survey inaccuracies.

Recommendations:

1. Develop rapid remote sensing survey processes with effectiveness well beyond the limited capabilities of human intelligence. Multi-spectrum airborne detection systems may offer promising emerging technology. An effective near term survey process should include the use of bomb dogs.

2. Develop an effective plastic and low-metallic mine detector system, which also detects conventional metallic mines. The availability of such a device will greatly reduce demining casualties, while boosting clearance efficiency at greatly reduced cost. A near term approach to this problem may involve performing more in-depth characterization of the effectiveness of bomb dogs, and developing knowledge on when dogs cannot detect mines, and how to improve the pinpoint accuracy of a dog detection.

3. Develop improved protective clothing and greater standoff neutralization technologies for deminers. The clearance process still involves an individual excavating and neutralizing a mine in close proximity to his body. Regardless of high survey and detection system effectiveness, an injury is currently inevitable when constantly handling such large quantities of mines and unexploded ordnance at the neutralization phase of demining.

Panel 5: Notes on "Humanitarian Operations" - SOF's Role

1. SOF possesses capability to perform collateral activities - unique capabilities (language and cultural training) ex: JCET - Joint Combined Exchange Training
   Primary Benefit - US and/or HN
   Dual track operations - routine engagement and crisis response
   Changes in law in FY96 allows greater latitude of assistance for HCA/HA
   Humanitarian Demining Program - successful example of Inter-Agency program (Mine Awareness, Mine Clearing) favorable attention from the White House and other national leaders
   World Bank will fund the transition process in Bosnia.

2. Humanitarian Operations and NGO's - derived from a workshop held at National Defense University in Fall '96.
   Now called Complex Humanitarian Emergencies (CHE)
   Question is when to hand-off to NGO's - sometimes working in same area
   Work with key NGO's as well as Indigenous NGO's
   Certain categories of analysis for cultural dynamics
      -Communication - Time - Flow of information - Acceptance of hierarchy
      -Avoidance of uncertainty - View of collectivism - Communication of Emotion -Role of Status
      -Recommended four (4) books on "Cultural Differences"

3. Demining is community reclamation - all infrastructure elements which permit people to inhabit on area of land

Modeling simulations - incorrect measures may lead to erroneous conclusions (body counts, drug seizure rates)

Test assumption - develop accurate statistics: Dogs are a useful tools, MEDDS which give a less than perfect results (residual ordnance).

Scenario Development - deductive criteria to clear clusters of mines.

Survey defines the mined and un-mined area to be cleared.

Probing alone achieves highest proof rates - very labor intensive and expensive - 99.5%.

Dogs with metal detectors - least expensive - 95% clearance rate.

Mine Awareness is the quickest cost-effective way to have immediate indigenous results.

Different modeling for commercial demining, SOF demining and indigenous demining.

4. Humanitarian Demining - in its 3rd year of Research & Development - its a complex problem.

Technology Program

Dogs put their nose right over the mines (can find the PMA-2)

Update on U.S. demining efforts in Bosnia (always 3 sets - Bosnians, Croatians and Muslims).

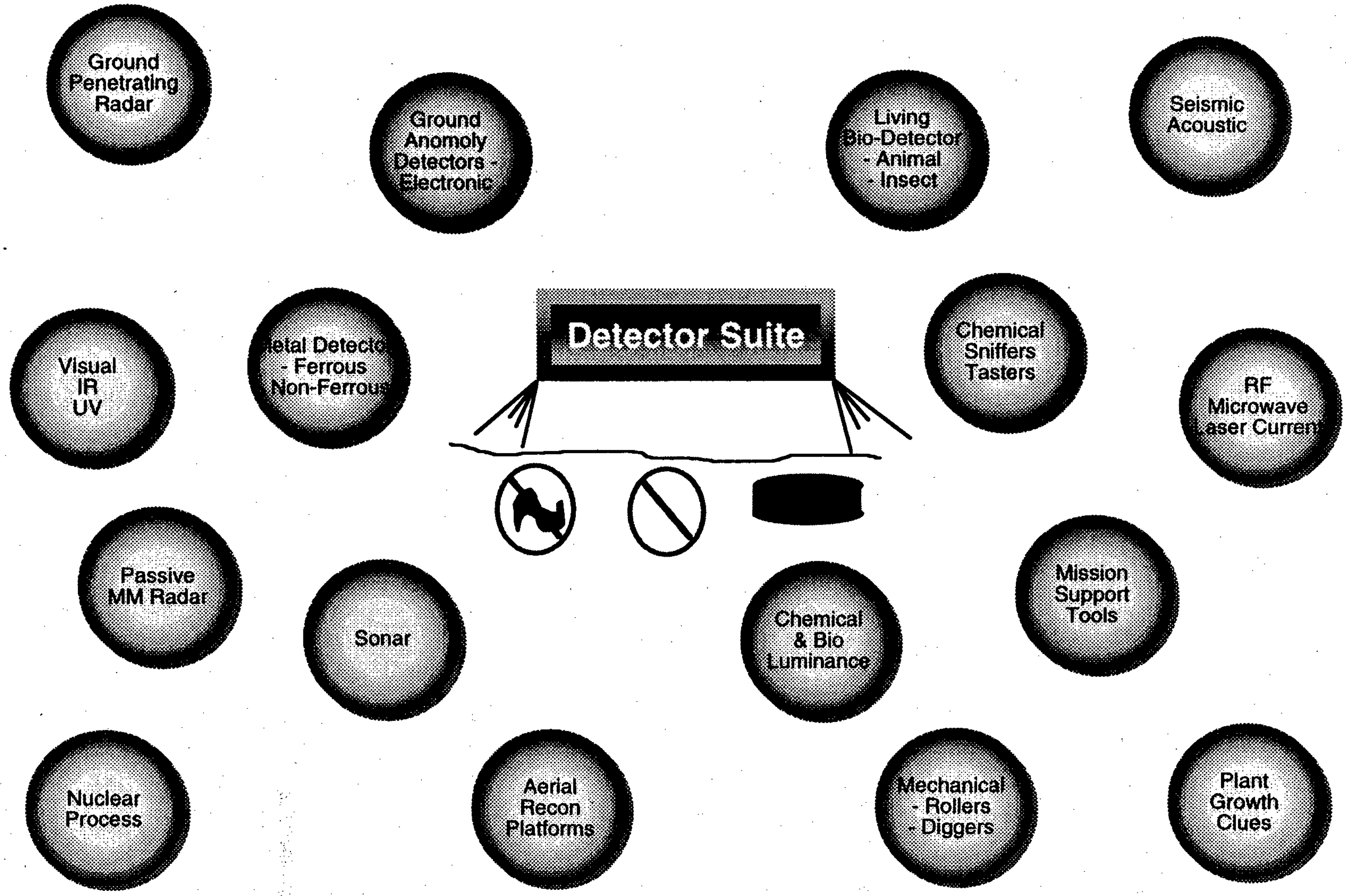
Discussed COTS (Commercial-Off-The-Shelf) for mine detection technologies.

Showed a 15-minute videotape SF personnel testing latest technology (LEX-FORM) for immediate use in demining operations.

Demining operations currently in Laos, Cambodia, Bosnia and Kuwait. Have developed a demining kit and have a soft demining manual in final draft

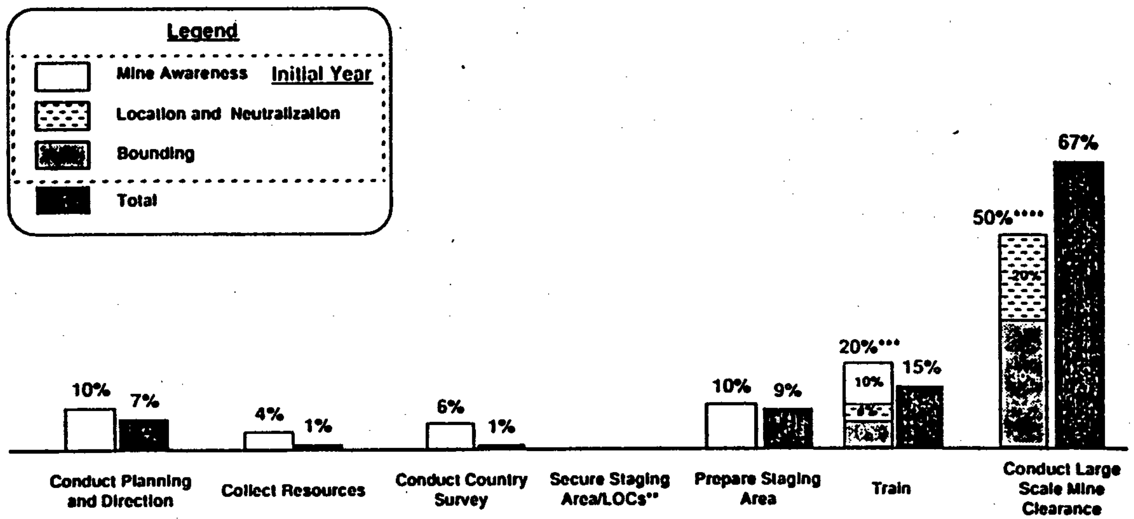
- U.S. shares this information with our SOF counterparts.

Mine Detection Technologies for Humanitarian Demining



Humanitarian Demining
A Complex Problem

- Mine Types
  - Amount of Metal Content
  - AT - AP
  - Fuzing
- Environment
  - Soil Type
  - Burial Depth
  - Vegetation
  - Structures/Obstacles
- Training/Mine Awareness Activities
  - Tactics/Techniques - What to do
  - Procedures - How to do it
  - Language/Cultural Drivers
- Economic/Political Considerations
  - Equipment Provisioning - Equipment Item Management and Sustainment
  - Bilateral/Multilateral Relations
  - Long Term Commitment to Develop Indigenous Infrastructures
- Technology Developments
  - Must be Exportable



Notes:

* As % of budget
** Captured in large scale mine clearance.
*** Salary only. Set-up and travel costs included in staging area preparation . 40% of total training costs are the salaries of the mine awareness personnel for the entire year, not just the period of their training. Mine awareness training of the population is a key training task.
**** 60 % of total is salary. 45% of total is expatriate salaries. ~ 5 % of total is salary and equipment--e.g. trauma kits--for ancillary personnel , medics,drivers, translators, etc.
***** 52% of total budget is salary.

Figure 5. Resource Requirements as Percentage of Initial Year Budget

• Scenario Development

Country	Area (km^2)	Estimated Number of Mines	Mines per km^2
Sudan	2,500,000	500,000 - 2,000,000	.5
Eritrea/Ethiopia	470,000	300,000 - 1,000,000	.5
Nicaragua	130,000	130,000	1
Somalia	637,000	1,200,000 - 2,000,000	2.5
Mozambique	787,000	2,000,000	2.5
Angola	1,250,000	9,000,000	7.2
Former Yugoslavia	256,000	2,500,000 - 3,700,000	11.3
Iraq	435,000	5,000,000 - 7,000,000	11.5
Afghanistan	650,000	9,000,000 - 10,000,000	14.7
Cambodia	181,000	4,000,000 - 7,000,000	30.4
Kuwait	6,200	5,000,000 - 7,000,000	373.5

Table 2. Scale of the Problem[5]


I can't smell a damn thing.
Larson

American Defense
Preparedness
Association

Special Seminars

Panel 6

Preparing (Modernizing) SOF for Future Operations - Maintaining US Superiority. How Do We Keep SOF on the Leading Edge? The O & M and Modernization Funding Dilemma.

Moderator: Colonel Paul Churchill Hutton, III, USA (Ret.)
Dyn Meridian Corp.

Featured Speakers:

"Into the Future: Modernizing SOF and Acquisition Support"
Colonel Kenneth W. Getty, Jr., USA (Ret.) and Colonel Bruce D. Mills, USAF (Ret.) - Sverdrup Technology, Inc.

"Unmanned Aerial Vehicles for Special Operations Forces: Are They Worth It?"
Major Stephen P. Howard, USAF
USSOCOM (CinC's Staff Group)

"US Special Forces and the Environment "
Ms. Laurie MacNamara and Mr. Brian Smith
Evidence Based Research

Into the Future: Modernizing SOF and Acquisition Support

Special Operations Forces' (SOF) missions have grown in recent years with new functional mission requirements such as counterproliferation of weapons of mass destruction and information warfare. There has also been a marked increase in SOF contribution to collateral mission requirements including combating terrorism, humanitarian assistance, peace support operations, and de-mining. This growth and complex change in mission requirements creates a host of issues which must be addressed directly. These issues include such items as force size, doctrine, training, resources, equipment, and political linkage. The responses to these issues will undoubtedly lead to further modernization of SOF. This paper addresses potential responses to two issues-- training and equipment -- and how changes in acquisition can support any modernization.

As the collateral and new primary mission requirements continuously change, SOF may sometimes be unprepared to accomplish these new missions, especially with the same efficiency and speed to which they are accustomed. The lack of definition for the changing missions poses a tremendous problem for planners, trainers, operators, acquirers, and maintainers because they don't have the details necessary to properly perform their functions. While SOF employment in support of traditional missions can be trained to and planned for, the non-traditional environment is difficult to define accurately. We need to find innovative ways to correct this situation.

First, in the area of training, we must develop better approaches to anticipate and forecast training requirements and to then directly feed those requirements to our training institutes with sufficient time to effect new training programs or to modify existing programs. SOF training institutes need to be manned, equipped, and prepared to respond rapidly to these changing requirements. Existing Selection and Assessment programs must be enhanced with better objective criteria to insure SOF are manned with the right people. Initial SOF training must be continually evaluated against current and anticipated requirements. Experienced SOF leaders using advanced training methods and concepts will insure SOF is prepared to rapidly assimilate new missions. Currently when operations are planned it is assumed we have operationally ready SOF. In the future this may not be the case if the mission is new or the requirements for a known mission have changed. SOF will not have the luxury of waiting for extensive training. They must have the skills, knowledge and attitude that will allow successful execution of operations with limited preparation.

Trainers must also be innovative in the ways they train SOF, not only from the techniques needed for traditional SOF missions but in uncommon training for potential and often unforecasted missions. In other words, our trainers must anticipate missions and develop new training approaches even though this training may never be used. Trainers need to anticipate "rule" changes in the conduct of operations and train SOF for these potential rule changes. Trainers must be also be innovative in properly balancing known training needs with "potential" training needs. The bottom line to training is an essential need for a disciplined approach with "out of the box" thinking.

Second, defining and forecasting requirements to meet the diversity of potential missions also represent tremendous challenges. Equipment and systems requirements must be well thought out, acquired, and then supported. But new missions don't always follow old rules. As with training, SOF operators expect the right equipment to be available at the right time—at the time of planning and mission rehearsal before operations. In today's rapidly changing geopolitical and potentially unstable environment, we may not have even envisioned the equipment that may be required, much less developed or acquired the equipment and placed it in the hands of the warfighter. So, we need better ways of responding to these potential changes in sufficient time to positively affect the outcome. For example, if SOF need a new weapon or piece of equipment to meet a new requirement, we cannot wait on the current acquisition system to acquire that weapon because it generally takes too long. We believe there are ways to improve and correct this situation.

One way is to seek improved intelligence support. Political change in the world in the last decade has affected collection strategies and systems which are more geared towards support of general purpose forces with complex physical collection devices. By insisting on intelligence collection systems which are more supportive of SOF, including human intelligence, and applying SOF representation more effectively in the collection requirements process, improved data will be available for tailored exploitation. To properly support future training and procurement for the SOF warfighter, exploitation of intelligence data must focus more on prediction rather than reporting of past events. A team approach to applying finished intelligence data must occur. For example, rather than having the analysis conducted totally within intelligence channels, a separate group of SOF and industry experts supported by the intelligence community could be formed with the express purpose of reviewing the information available and then forecasting equipment needs from that information. Who better knows how current technology can be employed than the industry who developed the technology and the experts accustomed to and most familiar with employing technology for new mission requirements. This process unites the technology of industry with the operational experience and mission planning of the warfighters with intelligence analysts and data interpreters.

An approach to implementing this idea is to form a partnership between industry and SOF to anticipate future requirements and to be prepared to respond quickly and resolutely to changing needs for our forces. The industry/SOF partnership can be patterned after some existing forums such as the Defense Science Board, but care must be taken to maintain currency within the group on leading edge technologies. Senior industry members sitting on corporate boards don't usually have this information because they are too far removed from every day activities on these technologies. These people are not necessarily suited to participate in this partnership. Likewise, an operator not currently versed in the latest SOF techniques is not suited for this partnership. Care must also be taken to eliminate vested interests from a particular industry focus in hopes of getting new business or a particular element of SOF wanting a new mission. The key to solving these membership difficulties is leadership and SOF have leaders who can eliminate biases. In the aggregate,

the partnership with industry can help forecast needs and identify leading edge technologies and potential approaches to solving needs well in advance.

Once potential technologies and solutions have been identified, we need to reduce the time it takes us to get those solutions into the hands of our operators as well as to reduce the costs involved. On-going acquisition reform will provide major improvements to permit this rapid response. For example, the Federal Acquisition Streamlining Act (FASA) of 1994 and the Federal Acquisition Reform Act (FARA)of 1996 provided major statutory changes which are drastically changing the bureaucratic ways we have acquired systems in the past. Don't believe that all the barriers are removed because many still exist. But, FASA and FARA are tremendous first and second steps on the road to change.

Also, major regulatory changes have been and are being made which give more authority to the Program Manager responsible for fielding a system. DoD's 5000 series regulations were changed last year to allow more flexibility to the PM and to eliminate much of the mandatory "how-to". Likewise, the major Federal and Defense Acquisition Regulations (FARs/DFARs) are being reviewed for elimination of impractical limitations; it has become relatively easy to obtain waivers for those regulations that don't make sense or create major barriers. For the services and USSOCOM, internal regulations and policies are being reviewed for elimination to further speed and improve the acquisition processes we follow.

Removing statutory and regulatory barriers isn't enough. The SOF/industry partnership must employ what has become known as "out-of-the-box" thinking, a concept proven by the USSOCOM staff. The partnership cannot rely on marginal improvements based on old methods and traditional ways of thinking to solve problems. They must look for the unorthodox approaches and the approaches that will provide major steps in shortening the process, reducing costs, or improving performance. They and DoD decision makers must be willing to take more risk. No longer can our forces take the no-risk or risk-aversion approach to problem solution. SOF are leaders in using risk management approaches rather than risk avoidance. We must now translate this risk management philosophy to acquisition.

The SOF/industry partnership must adopt other approaches to improve this acquisition process used to provide the right equipment at the right time to SOF. SOF must continue to use the idea of more commercial products and practices which follows closely with the concept of risk management and potentially cheaper products. No longer can we rely on the cumbersome and expensive approach of military standards and specifications as the sole driver of design. We need to give industry flexibility to deliver reliable and quality equipment without imposing rigid specifications which directly drive cost. Similarly, we should give industry the opportunity to use commercial practices instead of dictating a specific approach to a function.

Another "out-of-the-box" idea is to drastically change our approach to working with industry. Many groups and services have already adopted the approach of Integrated

Product Teams (IPTs) with industry and early results are very encouraging. IPTs have resulted in closer working relationships, eliminated some of the unnecessary barriers between industry and the government, and greatly improved teamwork. But, we need to go further. The Government must give the contractors responsibility and accountability for doing a job and reward them accordingly. If they do a good job, they should earn a reasonable profit and stand a good chance of obtaining future work. If they do a poor job, they should not be rewarded and should not be used for other work in the future. Of course, we need to look closely at why they failed, but most often we are too lenient with recalcitrant contractors.

To date we have only scratched the surface on how to improve the process – we need to posture the SOF/industry team to meet emergent, urgent requirements supporting the special operations soldier, sailor, or airman in the future. SOF will be employed well into the next century and their success will depend on specialized capabilities supported by a full spectrum of appropriate technologies and correct training. Better forecasting of requirements, innovative training, and acquisition reform are steps in the right direction to improving support for the SOF.

Unmanned Aerial Vehicles for Special Operations Forces: The Sky's the Limit

by Stephen P. Howard
Major, USAF

The United States Special Operations Command (USSOCOM) provides unique capabilities not found in other elements of the U.S. armed forces or those of other nations. Recent history has encouraged the United States to maintain specialized forces capable of performing extremely difficult, complex, and politically sensitive missions on short notice, in peace and war anywhere in the world.

Special operations forces (SOF) include fully developed land, air, and maritime forces, often integrated as a joint service team, but capable of operating as single service units. These forces include:

- U.S. Army Special Forces, the 75th Ranger Regiment, the 160th Special Operations Aviation Regiment (Airborne), psychological operations (PSYOP), and civil affairs (CA) units.
- U.S. Air Force special operations squadrons (fixed and rotary wing), special tactics squadrons, and a foreign internal defense aviation squadron.
- U.S. Navy Sea-Air-Land forces (SEALs), special boat units, and SEAL delivery units.

These small, often isolated units provide a fast reaction worldwide capability. To perform their various missions over vast distances and inhospitable terrain, SOF need long range, reliable, cost effective support assets. Manned aircraft and satellites have traditionally provided the operational information, re-supply, and psychological operations support needed to conduct worldwide operations. However, recent technological improvements in unmanned aerial vehicles (UAVs) make them a viable alternative for several situations.

Operational Information

Special operations forces originate and use all types of information. SOF units provide surveillance, reconnaissance, and other operational and strategic levels of information for the regional Commanders, United States' Ambassadors, their country teams, and other government agencies. This information helps decision makers see the broader picture and fills gaps unseen by technological intelligence gathering means.

The ability to communicate is critical to all SOF operations. Currently, USSOCOM has invested heavily to procure state-of-the-art communications equipment for its forces in the field. By combining line-of-sight radios with satellite communications capabilities, SOF operators can usually communicate anywhere in the world. However, as

adversaries become more technologically sophisticated, hostile actors' ability to disrupt or destroy satellite capability will increase. Therefore, the potential for making SOF in the field "deaf and blind" may someday be real.

To prevent a total loss of communications, the Department of Defense should examine the use of high altitude endurance UAVs as potential communications relay platforms. UAVs, flying at sub-space altitudes (10-12 miles above the surface of the earth), could act as satellite substitutes, ensuring SOF a back-up capability for communicating should their primary means be disrupted or destroyed.

During *DESERT STORM*, SOF furnished special reconnaissance supporting the theater campaign plan. These units worked behind enemy lines, relaying current intelligence on troop movements and enemy dispositions to senior military leaders unavailable through other intelligence gathering means. They observed and relayed a variety of information to decision makers which improved the overall operational perspective of the theater Commander. However, these forces were in constant danger of discovery and personal harm.

To reduce the danger to operators in the field, specially configuredUAVs could support SOF operations. There are currently numerous UAVs under development that have potential for supporting SOF. The scope of this paper is too narrow to make specific recommendations. However, it is imperative that UAV developers build reliable aircraft that can loiter for extended periods of time, undetected, day or night, in adverse weather conditions. These UAVs must have a payload that is easily adaptable and capable of accommodating a wide range of sensors and equipment that can be tailored for a specific SOF mission.

Once a suitable platform is developed, the sensor-laden UAV would loiter, undetected, above the SOF operating area. In addition to sensors, the SOF UAV (as previously suggested) would be equipped with state-of-the-art communications equipment. It could then act as a communications relay platform, creating a SOF AWACs or JSTARS-like overhead platform capable of observing, recording, and passing information to both the operators and military commanders. This overhead presence, controlled by the on-scene commander, would relay operational information to everyone involved, thus improving overall situation awareness. This increased information flow would also decrease personal risk to the forces deployed.

By creating a SOF AWACs or JSTARs UAV, several potential problems are averted. With more and more situations requiring SOF, there is a growing challenge for providing dedicated satellite communications frequencies to operations in the field. Equipping UAVs with state-of-the-art communications, in addition to sophisticated sensor suites, greatly reduces SOF reliance on national assets like satellites and manned aircraft (RC-135s, U-2s, ABCCC, etc.). An unmanned aerial vehicle, deployed with a high frequency radar or millimeter wave technology, can scout the immediate area and provide enhanced reconnaissance and mapping capabilities. The special reconnaissance team, or

other deployed force, can maneuver the UAV and look for danger, troop dispositions, or obstacles and then communicate that information to military leaders without leaving the protection of their concealed position.

Special Operations SEALs often operate in advance of US Navy and Marine Corps formations providing hydrographic reconnaissance to determine harbor, beach, and surf conditions. SEALs often swim perilously close to hostile forces, gathering information and relaying it to their superiors. A maritime UAV could perform unmanned near-shore hydrographic reconnaissance and shallow water mine detection without imperiling SEALs. Loading blue/green lazier technology sensors in the payload bay of a UAV could provide accurate hydrographic, obstacle, and mine detection information. The UAV would not only pass more complete information to the Joint Force Commander, but most importantly, improves the survivability of SEALs operating under hazardous conditions.

Re-Supply

Another major challenge facing all special operations forces in the field is re-supply. Because of the distances, terrain, and often hostile working environment, it is very difficult for them to carry sufficient supplies for more than a few days. For extended operations, manned aircraft deliver food, water, batteries, and other critical equipment and supplies. Current re-supply operations are very dangerous to both the aircrew and the special operations forces. The aircraft not only exposes itself, but also exposes the team it is re-supplying by giving away their location. To prevent this, specially configured cargo UAVs could come in lower, slower and quieter, thus eliminating the risk to anaircrew and still providing the necessary support to the operators.

UAVs carrying cargo should be developed to transport several hundred pounds of food, water. and equipment, greatly increasing mission flexibility for all SOF. A deployed special reconnaissance team could be re-tasked to perform Direct Action or Unconventional Warfare after a *Cargo-UAV* carrying ammunition, heavy weapons, and explosives safely delivers its hazardous cargo. This added flexibility allows the team to move farther, faster, and quieter without being encumbered by large amounts of heavy and hazardous material.

Under certain circumstances, *Cargo-UAVs* could deliver a boat, motor, and gas, allowing a team to furnish its ownexfiltration. In extreme situations, it is conceivable that exfiltration UAVs could land and evacuate personnel who would otherwise be unreachable. This *Exfil-UAV* might fill the gap left by the now extinct Fulton Recovery System once used on MC-130 Combat Talons, to extract personnel from dangerous situations.

Psychological Operations

In addition to operational information and re-supply, there are numerous ways in which properly configured UAVs can support Psychological Operations (PSYOP). USSOCOM currently has a requirement for a UAV with a payload capable of dispensing information leaflets. These UAVs could fly over dangerous, denied, or hostile terrain and deliver the leaflets to locations assessed as too hazardous for manned aerial platforms.

PSYOP-UAVs could also be equipped with radio broadcast and loudspeaker capabilities to disrupt local broadcasts or send messages where the target audience is difficult to reach. This type of UAV could broadcast information to terrorists and hostages during a crisis situation. During a long-term standoff, these UAVs could deliver "harassment noise" similar to that used against Emmanuel Norriega during *JUST CAUSE*. These PSYOP-UAVs could also convey helpful information to civilians in times of emergency and in support of disaster relief. In the past, loudspeaker broadcasts have often been ineffective because the sound was too far away from the intended audience. However, using UAVs configured with state-of-the-art communications equipment delivers the message closer to the intended audience without endangering lives.

Conclusion

Special Operations offer a fertile ground for the imaginative and innovative use of UAVs. The SOF community often serves as a "proving ground" showing the value and flexibility of new technologies and equipment. SOF led the way and revolutionized night-time warfare by *"owning the night."* Today all levels of the Army, Navy, Air Force, and Marine Corps use night-fighting techniques pioneered by SOF.

Therefore, SOF should fully cooperate with the Services to act as the "guinea pig" for new ideas. More research and coordination are needed between SOF and the people responsible for developing current and future UAVs. A unified effort now can save money and increase capabilities in the future. Let SOF's unique structure and capabilities provide the proving ground where all may learn and share.

U.S. Special Operations Forces and Environmental Infrastructure

Laurie J. MacNamara
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Future missions for U.S. Special Operations Forces (SOF) units will include the protection of important infrastructure assets which are directly linked to the environment, and, in some cases, could be targeted in operations of "environmental warfare" or "environmental terrorism." Among the environmental infrastructure concerns U.S. SOF will need to pursue is the protection of hydrological assets, notably hydroelectric dams, agricultural dike systems and waterworks against local and transnational actors hostile to a government friendly to the United States. As most of the sites for hydrological asset construction close to urban areas have already been utilized, construction will move into more remote and marginal areas, which are likely areas for U.S. SOF deployments in humanitarian operations. Thus, the protection of these key assets will be an important mission for U.S. SOF in the future.

As demands for electricity, fresh water, and irrigated farm land increase in the developing world, additional hydrological infrastructure will be constructed. Construction of this type of infrastructure, especially dams, often requires temporarily, and, in some cases, permanently dislocating large number of indigenous peoples from their traditional areas. Future missions for U.S. SOF will include operations aimed at protecting hydrological asset site during construction and protecting the asset following completion and initial operation. Aspects of this mission may include the training of local forces in the prevention or remediation of environmental damage done in the course of construction, resettling dislocated populations, providing security for temporary encampments or providing a rapid response capability in support of local forces.

In addition to contending with issues stemming from indigenous peoples, U.S. SOF may be tasked with protecting hydrological infrastructure against the forces or proxies of downstream riparian states. U.S. SOF also may be tasked with taking control of the same infrastructure to prevent catastrophic environmental damage downstream.

This new mission should impact U.S. SOF training, technologies and doctrine. Engineer sergeant training should stress familiarity with operating the infrastructure asset including knowledge of basic civil and structural engineering, especially in the case of large dams, water systems and power grids. In addition to the basics of engineering, detachment officers should possess knowledge of local terrain and the hydrological system in general to best supervise U.S. SOF experts on their teams. Amendments to field training exercises, which combine common skills and specialty training, would also be warranted. In addition, some situations would necessitate training of local forces in the prevention of additional environmental damage from construction or their own operation, the resettlement of displaced populations, and for long-term security operations. Technology adjustments should stress C4ISR, countermine, and environmental impact. Doctrine should address cultural sensitivity in working in remote and ethnically disparate areas, and impact of operations on the local environment, emphasizing environmental remediation and transitioning to a longer-term security arrangement with local forces.

U.S. Special Operations Forces and Environmental Infrastructure

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> We now have what we call complex emergency operations, or CEOS as we call these operations, because there is a little bit of peacekeeping, a little bit of economic recovery, and a little bit of [environmental protection]...we are now discovering that environmental issues are critical and a key part to whatever got us into that situation, or what is directly or indirectly aggravating the situation.[1]
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> Lt. Gen. Anthony T. Zinni, USMC
> Deputy Commander-in-Chief, USCENTCOM
> Deputy Commander, *Operation Provide Comfort*

Introduction

In the future, U.S. Special Operations Forces (SOF) units will increasingly deploy in support of complex emergency operations (CEOs). Experience gained in planning and preparing for CEOs, has demonstrated that the environment plays a critical role in field situations. While a strong focus on environmental protection has driven regular forces to minimize their environmental "footprint" through prevention, cleanup, and conservation measures, environmental considerations for SOF emphasize an additional set of mission challenges in the form of protecting key infrastructure assets which are directly linked to the environment. This new mission dimension can and should be seen as a necessary planning component in OOTW, in foreign internal defense (FID) operations, and in traditional military operational planning. While SOF future mission planning will need to address environmental protection and conservation, defending, reconstituting or seizing environmental infrastructure will represent an increasingly important element of SOF environmental responsibilities. This paper, which focuses on hydrological infrastructure assets by way of illustration, addresses SOF's emerging relationship with environmental infrastructure and the implications for SOF training, technology, and doctrine.

Protecting Environmental Infrastructure: The Future SOF Mission

As demands for electricity, fresh water, irrigation, and arable land grow in the developing world, there will be a pressing need to build additional hydrological infrastructure. Hydroelectric dams, flood control dams, levee networks, and water purification plants provide critical energy and fresh water to the commercial and agricultural sectors of the

[1] "Luncheon Address by Lieutenant General Anthony Zinni," *International Environment and Security Issues in Professional Military Education and Research Workshop Final Report*, National Defense University, August 1996 (unpublished typescript).

developing countries where SOF will be increasingly engaged in CEOs, FID missions, and training exercises. Most developing countries with significant hydropower potential deliberately pursue large hydroelectric projects to address potentially disastrous shortfalls in electricity supplies.[2] Hydroelectric power allows developing countries to exploit an available source of clean power without having to import expensive fuels, thus aiding their balance of payments while providing jobs and income through massive public works construction. The World Bank has taken on the role of primary financier for hydroelectric projects worldwide. Over the past 5 years, the Bank's energy sector lending has averaged \$574 million annually to South Asia (where USCENTCOM is supported by the 5th SF Group, Ft. Campbell), \$181 million annually to sub-Saharan Africa (where the 3rd SF Group, Ft. Bragg, supports USEUCOM), and \$93 million annually to the Middle East and North Africa (also a 5th SF Group responsibility).[3] Based on the high levels of funding for energy sector development coupled with expanding demands for fresh water driven by population growth and industrialization, we project accelerated construction of hydrological infrastructure in these regions of strategic and operational interest to SOF.

In many developing countries, the majority of the potential sites for hydrological infrastructure asset construction near large urban areas has already been utilized; escalating urbanization places increasing pressure on water resources in those same urban areas. As a result, construction will by necessity move into more remote and marginal areas. Construction of environmental infrastructure, particularly large hydroelectric dams, often requires the temporary or even permanent dislocations of large numbers of people. Unless championed by a powerful elite, these dislocated peoples may be relocated to marginal and environmentally fragile lands or they may choose to migrate to crowded urban areas. Depending upon the local political situation, the construction of large hydrological assets may prompt or galvanize disaffected subnational groups into undertaking violent opposition to the project and/or the government.

In the type of scenario described above, SOF units may deploy to train local forces in the prevention or remediation of environmental damage done in the course of construction; in the resettlement of displaced populations; in the provision of security for temporary encampments; and/or in the provision of rapid response capability. SOF units may be deployed on an FID mission that requires the protection or reconstitution of a hydrological asset during construction or initial operation. In some instances, SOF units may need to take on an FID mission in support of current humanitarian operations by restoring critical electrical and fresh water supplies to the affected population.

A related concern in the construction of hydrological infrastructure will be the impact of the infrastructure project on the relationship of the state with riparian neighbors. As few river systems are wholly contained within one state, the construction of dams, canals, and aqueducts which interrupt river flow may have drastic consequences for downstream

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[2] Brown, Lester R., et.al. *State of the World 1995: A Worldwatch Institute Report on Progress Toward a Sustainable Society.* (New York: W.W. Norton and Company, 1995): p. 45.
[3] *The World Bank Annual Report 1996* (Washington, DC: The World Bank, 1996), tables 4-1, 4-7, 4-10, 4-16.

states as demands for fresh water increase. To date there have been several examples of the construction of hydrological infrastructure assets significantly contributing to tensions between states, most notably between Turkey Iraq, and Syria, Israel and Syria, India and Bangladesh, and Egypt and Ethiopia. In the future, SOF units may be tasked with protecting hydrological assets against the forces or proxies of downstream riparian states either during construction or during asset operation. In addition to protecting hydrological assets, SOF may be tasked with the more traditional military mission of seizing such assets in support of FID missions with a downstream riparian state.

Defending a hydrological asset, such as a dam under construction, requires an understanding of not only the dam design but also of the construction process itself. While nearly impervious when completed, a large dam is vulnerable while under construction. Dams require a consistent construction pace once the construction of the foundation has begun. Temporary earthen coffer dams are erected upstream to protect the main dam construction site as preparations are made for laying the foundation. (If the coffer dam is washed away before the foundation is ready, the dam site must be moved to a new location or the project itself must be abandoned.) Once the dam foundation is set, the concrete must be poured at a constant rate so that maximum strength is preserved. In order to maintain the required rate, the concrete is mixed on site and pumped into the forms and over a steel framework. Mixing on-site requires that sufficient materials — portland cement, clean fresh water, and aggragate — be kept on hand so that the necessary pour rate can be maintained. While the construction site can store several days worth of materials, the volume of material involved requires ready access by rail and by road. In the case of aggragate, it is usually shipped from a quarry by rail or by conveyor belt. The construction site will also require electrical power for the mixers, pumps and lights. While this may be provided by on-site generators, storage of additional fuels and spare parts would be required. The construction process can withstand delays of a few days, but repeated stoppages will reduce the strength of the dam, thus putting its viability at risk.

Other hydrological assets such as levees are vulnerable even after construction. A simple levee is often constructed from material dredged from the targeted river, with some additional layers of clay and heavier rock materials placed on the river side to reduce the effects of erosion. However, unless shored up by additional materials, levees are vulnerable to heavy rains, floods, or sabotage. A few carefully placed holes driven through the levee would leave it and the property behind it vulnerable to destruction.

The Implications of Environmental Infrastructure Protection for SOF: Training, Technologies, and Doctrine

The protection of environmental infrastructure as a new mission should significantly impact SOF training and, to a lesser extent, SOF technologies and doctrine. The knowledge required to ensure the viability of hydrological infrastructure assets, including their restitution following a premeditated attack, will clearly put a premium on engineering skills. During the military occupational specialty (MOS) phase of the

Special Forces Qualification Course (the "Q" course), trainers should seek to increase the number of candidates eligible for the SF Engineer Sergeant specialization. Those selected for the SF Engineer Sergeant designation should develop a sophisticated understanding of civil and structural engineering; familiarity with the classes of assets that may require protection in the areas to which the SF Engineer Sergeant is expected to be deployed; a detailed knowledge of local construction materials and how these can be used effectively in reconstitution efforts; and familiarity with construction techniques that can be easily taught to local forces.

While the SF Engineer Sergeant plays the key technical role in the new SOF mission, he must be supported by the SF Weapons Sergeant to be truly effective. The SF Weapons Sergeant should provide an understanding of the small-unit tactics of foreign forces that may impact environmental infrastructure, such as specialized techniques for levee destruction. His training should include an emphasis on the development of this knowledge.

In order to effectively supervise SOF experts on his team in FID operations involving environmental infrastructure, the SF Detachment Officer should possess an extensive knowledge of the local terrain and of existing hydrological assets, as well as an understanding of the importance of the assets to the local economy and environment. A Detachment Officer's specialty training should contain enough background on environmental protection and remediation techniques to enable him to effectively supervise asset construction and reconstitution with minimal environmental damage.

Field training exercises should include simulated attacks against environmental infrastructure that are emblematic of the challenge SOF will face in the future. Possible scenarios could comprise a guerrilla attack on a levee or waterworks, requiring defense of the asset in conjunction with local forces, or reconstitution of a damaged asset necessary to the ultimate success of a humanitarian mission. The field training exercises provide a critical opportunity for the SOF experts on the "A team" to bring their skills to bear.

FID operations undertaken in the Amber Cycle of training should stress the training of local forces in the prevention of additional environmental damage from construction or their own operation, the resettlement of displaced populations, and for long-term security operations.

In addition to changes and improvements in training, environmental infrastructure asset protection will necessitate the use of some of the most advanced technology SOF is developing today. Enhanced C4ISR capabilities will be required for situational decision making in the hostile attack force scenarios. Advanced countermine technology will be required to protect the asset against the most likely means of attack. Environmental protection and remediation technologies should be utilized to the extent possible during the mission.

Finally, doctrine should emphasize cultural sensitivity in working in remote and ethnically disparate areas, as well as the impact of operations on the local environment, emphasizing environmental remediation and transitioning to a longer-term security arrangement with local forces.

Conclusion

In considering its future missions, SOF must consider the importance of environmental infrastructure protection to a successful mission. Environmental infrastructure, such as hydroelectric dams, form an increasingly important component of the economic livelihood of regions of strategic interest to SOF. With inherent construction vulnerabilities, these assets are susceptible to attack by both disaffected subnational groups and hostile neighboring states. SOF should consider minor adjustments to training regimens, technology design, and doctrine development, in order to most effectively prepare for asset protection in CEOs, FID missions, and traditional warfare operations.

American Defense Preparedness Association

Additional White Papers

"SPLLAT Munitions in the SO/LIC Environment"
Mr. Charles M. Byers, Vice President, Accuracy Systems Ordinance Corporation, Phoenix, AZ

"Fire Ant and Lady-Bug, Stealthy High-Mobility Vehicle for Transport by CV-22"
Mr. S. Paul Dev, D-Star Engineering, Shelton, CN

"Casper: The Ghostly Friend"
Mr. S. Paul Dev, D-Star Engineering, Shelton, CN

"Civil-Military Operations and Civil Affairs: A Version for the Future"
Major Tim Howle, USA, JFK Special Warfare Center

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Additional White Papers

"The Future of Simulations and Exercises for Special Operations Forces"
Mr. Kenneth E. Kaizer, Evidence Based Research (EBR), Vienna, VA

"SOF 2020: First Force"
Lieutenant Colonel David MacNeil, USAF, USSOCOM (SOJ5-05)

"Force Protection: Security and Intelligence"
Roderick (Rod) Lenahan, TRACOR, Applied Sciences, Inc. in Collaboration With Frank Mazzone, NISE East

"Biological Terrorism: The Threat and the Response"
Frank McDonald, Bio Matrix, Cambridge, MA

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Additional White Papers

"New Miniature CW Detectors to Support Special Force Operations in a Chemical Environment"
Mr. Garry Murphy, Dr. H. Wohlthen, and Dr. N.L. Jarvis, Micrisensor Systems, Inc., Bowling Green, KY

"Operation Provide Comfort Communications - A Precursor to SOF C4I Strategy"
Colonel John J. Myers III, USA, USSOCOM (J-6).

"Below Line-of-Sight Threat Detection/Geolocation for Covert Infiltration/Exfiltration"
Mr. William F. Santiff, Amecom Division, Litton Systems, Inc. College Park, MD.

SPLLAT MUNITIONS IN THE SO/LIC ENVIRONMENT

STUN GRENADES AND DIVERSIONARY/DISTRACTION DEVICES
(Special Purpose Low Lethality Anti Terrorist [SPLLAT] Munitions)

There is little doubt that the single most important life saving development for law enforcement tactical officers since Richard Davis invented his Second Chance soft body armor in 1972 has been the introduction of Special Purpose Low Lethality Anti Terrorist (SPLLAT) Munitions.

Commonly (and sometimes incorrectly, depending on the relative Power Level) called "Stun Grenades", "Flash-Bangs" or "Flash-Crashes", these unique life-saving munitions not only provide a decisive tactical advantage to the arresting officers, but have often saved the criminal's lives as well as any hostages and/or innocent bystanders, including the police themselves.

When a properly selected SPLLAT Munition is utilized correctly, even the most violent and dangerous armed felon can be instantly rendered incapable of effectively resisting capture. Since the perpetrator is instantly, but only temporarily, incapacitated he cannot shoot at the police, so, in turn, they do not have to use deadly force to effect his capture. Also, due to the instant incapacitation effect, the criminal will be unable to shoot any hostages present. An added benefit to all concerned will be the dangers caused to innocent bystanders by stray bullets whizzing through walls, down alleys and across streets.

While there a wide variety of SPLLAT Munitions available today for both military and civilian Counter Terrorist, Hostage Rescue, Correctional Institution and Mob and Riot Control SWAT Teams, they all function in basically the same manner. These devices, normally designed with a short (nominally one second) delay fuze, produce a stunning, disorienting blast and a brilliant, dazzling flash. This "double barrel" effect has proven quite effective in instantly stunning and effectively incapacitating even the most violent felon, permitting his subsequent apprehension with a minimum of risk to the arresting personnel.

Most importantly, due to the unique design of these SPLLAT Munitions, they perform this life saving mission with much less chance of serious injury or death that capture/rescue attempts that utilize only the old fashioned "Thompson Technology":

(Shoot 'em all & let God sort 'em out!)

Since these unique, life saving munitions have been available for almost a decade, it is surprising to learn that quite a few agencies are either not aware of their capabilities or, for some reason, do not effectively utilize them in their tactical operations. At least not with the proper procedures necessary to assure their maximum effectiveness.

One of the least understood aspects of SPLLAT Munitions concerns the relative effects of their explosion. Basically, the explosion of either Stun or Distraction/Diversion (yes, there is a very significant difference and it will be covered shortly) consists of both Blast and Flash. Depending on the design of the particular munition, it will produce more or less smoke in conjunction with the explosion. In no case, however, should a properly designed SPLLAT Munition produce any significant fragmentation, including the violent projection of either the heavy metal fuze body or parts of the grenade body itself.

Of the two basic "STUN" Grenade effects, blast and flash, it is the blast that is by far the most effective of the two. As a result of the feedback from literally hundreds of test firings and dozens of actual "field reports" it has become quite apparent that it is the blast that provides the majority of the effectiveness of the SPLLAT Munitions. While the flash can be very bright and can be expected to "dazzle" a suspect, it will only do so under the proper conditions. If a suspect is in a darkened room, his pupils are dilated, and he is looking directly at the munition when it explodes, it is reasonable to expect that the suspect will be temporarily dazzled and effectively blinded by the bright flash. If, however, the suspect is outdoors in the bright sunlight, or is in a well lighted room, either condition of which will cause his pupils to be contracted, the flash may well prove to be ineffective. Similar non-results can be expected if the suspect happens to shut his eyes (or even blink) just as the munition goes off, or if he has his back turned to the explosion or the explosion is otherwise shielded by furniture or other objects.

The blast, however, has been repeatedly proven to be the most effective portion of the explosion. It has proven to be a truly omnidirectional effect, with only minor shielding being caused by most common objects in a typical room.

The flash may or may not be effective, (because even a dazzled criminal can still fire a weapon), but the blast can be counted on to effectively, and instantly, incapacitate even the most dangerous armed assailant.

It is also important for a tactical officer to understand the terms "Blast" and "Explosion" and to have a feeling for what really occurs when a SPLLAT Munition goes off in the near vicinity of someone.

Basically, the explosion of almost all types of Stun and Diversion / Distraction Grenades/Devices consists of the extremely rapid burning of a mixture of very finely powdered metal "fuel" and a potent oxidizer (which furnishes the necessary oxygen for the rapid combustion). For the technically inclined, the metal fuels are usually magnesium or aluminum and the oxidizers are either potassium perchlorate or a similar chemical

with a high oxygen content.

Since both of these chemicals are in the form of fine powders, they have a very large surface area, and thus, upon ignition, will burn extremely rapidly. In the normal sub-ounce size quantities found in most SPLLAT Munitions, this combustion is normally completed in a few thousandths of a second. Due to the heat of the burning, the resulting combustion gases are heated to a high temperature and expand very rapidly, quickly rupturing their container and releasing the compressed gases into the atmosphere. This produces the overpressure we hear (and feel) as the "BANG".

Burning is a surface phenomena and it's speed is directly dependent on several variables. Notably important are the chemical composition of the explosive mixture, the size of the chemical particles, and, to a lesser extent, the type and degree of confinement of the explosive mixture.

In contrast to the burning (or deflagrating) explosive mixtures, true High Explosives normally function by detonating. In a detonation, a shock wave (initially caused by a detonator) actually flashes through the explosive at velocities sometimes exceeding twenty five thousand feet per second. This is several orders of magnitude faster than any burning explosives, and, accordingly, High Explosives are normally many times more powerful than burning explosives. It should be noted that High Explosives can also be burned. When ignited in small quantities out in the open, they generally burn enthusiastically but with nowhere near the speed of flash powder. It is when detonated that High Explosives really demonstrate their true power.

For illustrative purposes, a golf-ball size lump of C-4 plastic explosive, when ignited with a match, will burn for a minute or so. However, that same explosive, if rolled into a one inch diameter "rope" four miles long, and detonated with a blasting cap, would be entirely consumed in about a second.

After bursting the wall of the SPLLAT Munition, the hot, rapidly expanding gases from the burning of the flash powder provide the blast or "over-pressure" shock wave that provides the major effectiveness of the SPLLAT Munition.

This pressure wave is measured in pounds per square inch of over-pressure. The over-pressure being the additional blast pressure in excess of the normal air pressure of approximately 14 pounds per square inch (psi) at sea level. In the normal functional range of true Stun Grenades, this over-pressure is relatively small, being on the order of ten psi or less. In fact, the most effective pressure operating range of a stun grenade is from five to ten psi. At over-pressures much in excess of ten psi, physical injury is likely to occur, while at levels under five psi, only a Distraction/Diversion effect may be encountered.

The most common method of expressing the power level of a blast is in decibels (db). The quantity of a decibel is somewhat tricky to understand, but fortunately, it can be related to psi, which everyone is now aware of - at least somewhat.

Fortunately for modern SWAT Teams, there is a readily available and inexpensive gauging system with which to measure the blast level of the small explosive charges found in SPLLAT Munitions. This is the Anderson Blasgage, available from Accuracy Systems Ordnance Corp (ASOC), PO Box 41454 Phoenix, AZ 85080, price $100 per set. This set includes both the Blasgage itself (two 8 1/2" by 11" sheets of 1/8" thick aluminum plate, with ten matching sets of holes which provide the actual "Blasgages"), and 500 sheets of Blast Test Paper. A Special Mounting Bracket w/ Stand is priced at $375 each. (Blasgage extra).

The Blasgage set includes a Conversion Chart which provides a comparison of the relationship between Decibels (db) and Blast Over-Pressure (psi). As a quick inspection of the comparison table will show, there is somewhat of an overlap in the listed ranges of the psi and db. For instance, 175 db can be found to occur anywhere between .9 psi and 3.0 psi. There are some scientific explanations for this relatively wide variance, but a good, basic explanation is that the relative effectiveness of the blast of a SPLLAT Munition is not an exact science. Anymore than are the terminal ballistic effects of handgun bullets. Anyone long in the field of tactical law enforcement will have heard stories of suspects collapsing from a single hit with a .22 rimfire as well as those who received multiple hits from shotguns or rifles and still went on to kill the arresting officer.

To add some practical meaning to the effectiveness of SPLLAT Munitions, it can be stated that based on the reports of dozens of actual uses in the field, under actual tactical conditions, that a properly selected STUN Grenade when used correctly, will result in an essentially instant incapacitation of even the most determined criminal with something approaching a 90+% reliability. And with a corresponding potential of assuring this instant incapacitation without serious injury.

It is extremely important, therefore, to correctly define the exact definition of a true STUN GRENADE, and even more so to make certain that the user understands the difference between a full power "STUN" Grenade and the lower powered "Diversion/Distraction" Grenades .

Of additional interest is the fact that decibels are measured by what is scientifically known as a "Logarithmic Function". What this means is that for every ten decibel increase in blast level, you actually double the blast pressure. For instance, in going from 175 db to 185 db, the blast pressure increases from an average of 2.5 psi to about 5.5 psi. Note that the term BLAST LEVEL was used and not BLAST EFFECT. The

actual physiological effects on the suspect will be increased in going from 175 to 185 db, but they do not necessarily double.

Years of practical experience and numerous field reports have established the fact that to be considered an effective STUN Grenade, the munition in question must produce a blast level of at least 175 db at a distance of seven (7) feet from the point of explosion. The inclusion of the distance factor is extremely critical in describing the blast (decibel) level of any explosive device, Stun Grenades included.

For instance, a 20 KT Nuclear Bomb will product a blast level of 175 db at a distance of several kilometers. As will an empty, primed .38 Special cartridge case in a 2" Chief's Special if the muzzle is inserted directly into your ear.

Another interesting comparison of pressure levels is that the RATE of pressure application is very important. For instance, if you dive down to the bottom of an ordinary swimming pool, your body will be subject to overpressures on the order of a Stun Grenade. However, due to the relatively slow rate of application, no apparent damage will result. A similar demonstration can be made by slowly pressing the palms of the hands over the ears. Press slowly and only minor discomfort is felt. However, a good sharp slap will create extreme pain, even possible rupturing the ear drum.

Any Grenade or other Munition that produces a blast level below 175 db at 7 feet should be more correctly described as a Diversion/Distraction Device than a true "Stun" Grenade.

Grenades such as Accuracy Systems' M450 Multiflash (whose seven submunitions each produce 175 db at THREE Feet, and their M400 Safety Training Grenade are two good examples of the lower powered explosive devices that should never be relied upon to effectively incapacitate an armed felon. These lower powered devices will only distract him and divert his attention for a few seconds. Another important point to remember when utilizing the reusable, solid metal body grenades which have blast vent holes in their ends, is that the holes make the blast from the grenades extremely directional. The full power of such grenades will be experienced only when they are oriented end-on towards the suspect. If the grenade body is lengthwise to the target when the internal submunition explodes, a significant reduction in blast effect can be expected. In other words, the solid metal body grenades which are vented only on their ends can produce wide variations in their effectiveness. For maximum Tactical Reliability, non-fragmenting metal body grenades with side vents along the body are the better choice.

To repeat, anytime decibels are discussed in relation to the effectiveness of SPLLAT Munitions, the actual distance from the blast to the subject must also be included in order to make the information at all meaningful. Even though Accuracy Sustems'

M450 Multiflash Submunitions produce 175 db, they do so only at a maximum distance of three feet, whereas the M429 Thunderflash (a true STUN Grenade) produces the same blast level at a full seven feet.

Also, since the M429's Submunition produces a significantly greater amount of gas upon explosion than the M450's much smaller Submunition, even though both Submunitions happen to explode at their respective 175 db distances from the target, the larger M429's Submunition would be expected to be significantly more effective in incapacitating the suspect.

After determining the power level of the Grenade to be used for the specific task at hand, it is also important to consider the safety features inherent in the design of the Grenade itself. Extensive experience has shown that the safest design of Grenades are those that utilize an ejecting Submunition. Less desirable are those designs that either eject the fuze mechanism, or, even more dangerous, grenades that have the heavy, cast metal fuze screwed directly into the grenade's body where it becomes a potentially lethal projectile when the grenade explodes. Examples of the former design are the U.S.Government's Mark 141 Mod 0, which uses a plastic foam body as the explosive container. It's predecessor, the original FBI-designed M116 A-1 Hand Grenade Simulator, Modified, represents an example of the more dangerous design that throws the fuze. With such velocity that it can penetrate a sheet of 1/2" thick plywood! Such excessive penetration is certainly capable of causing serious injury or even death!.

An additional danger from the fuze-ejecting designs may occur in the event that careless handling of an armed or "live" grenade (pin removed and the safety lever being held down in order to permit rapid employment of the grenade) allows the safety lever to rise enough to permit the striker to slip under it and strike the primer in the fuze. One second later the Grenade will function. If it is the Submunition-ejecting design (similar to Accuracy Systems' M429, M459, M416 , etc.), the explosive-filled Submunition will be ejected out the bottom of the Grenade's main body prior to it's explosion. If, however, the grenade is of the MK 141, fuze-ejecting design, only the fuze will be ejected and the grenadier will be left holding the explosive charge. At least for a fraction of a second before it explodes! Right in his hand! Obviously the M116 A1 fixed-fuze design will not even give that fraction of a second of a warning. It will just instantly blow the grenadier's hand off!

In addition to evaluating both the basic safety of the design (submunition ejecting or non-submunition ejecting) and the power level (STUN or DIVERSION/DISTRACTION) of the SPLLAT Munition to be selected, the user should also be aware that there are several other very interesting and tactically useful designs of SPLLAT Munitions available on today's market. These include Thunder Rods, which are, as the name implies,

long,rod-like Munitions that are designed to be inserted through a small hole through a door or wall. These holes are usually made by using a 12 gauge shotgun with a frangible slug, such as the SHOK LOCK made by Accuracy Systems. Thunder Strips (these are nominally foot-long strips of thin, corrugated plastic which are filled with explosive and fired by means of a remote fuze assembly attached to a short length of flexable, hollow plastic Flashtube), which are designed to be inserted under a closed and locked door in order to produce an incapacitating, stunning blast inside the otherwise secure room. There are also Launchable Stun Grenades, which, while physically similar to Thunder Rods, are made with a special Plastic Obturating Cup on one end. In practice, the obturating cup end is inserted into a 12 gauge riot shotgun's muzzle, the safety lever secured by means of either a Shok Lock Adapter or a rubber safety-lever retaining device, the Safety Pin removed, and the M444 is then fired by means of a special M444 Launching Blank. The range of these launchable grenades is approximately 75 meters, and they are a lot more accurate than regular hand thrown grenades. They can even be fired through most standard glass window panes. While not of "Match Grade Accuracy" they are certainly a lot more accurate (as well as longer ranged) than any hand thrown grenade.

For tactical applications requiring the maximum amount of visual acuity, there is even a "Smokless" Stun Grenade available from Accuracy Systems. Their M416 MINI SMOKLESS Stun Grenade represents the current state-of-the-art in SPLLAT Munitions. The M416 is significantly smaller that any similar powered Stun Grenades, and in addition, it's explosion produces less than 10% of the smoke of other types of grenades. Added benefits are that since the M416 is designed with a different type of explosive loading than other grenades, it is also less likely to start fires. Also, it's flash is appreciably less than the other grenades, which can be a benefit when the entry teams are utilizing multiple grenades in darkened rooms. They will have a much less likelihood of dazzling each other.

While on the subject of "Dazzling" it should be noted that there are also STARFLASH Grenades available from ASOC. In addition to the blast and flash of the standard grenades, the Starflash Loading produces a brilliant shower of whitehot, sizzling "Sparklets" that provide a significantly more enhanced Diversion/Distraction Effect. Examples of the Starflash Grenades are the M451 Multi Starflash (similar to the M450, in that it ejects seven individual submunitions) and the M459 Starflash which has a single, large Submunition like the M429 Thunderflash.

The M470 and M471 are Magnum versions of the M429 & M459. These larger grenades contain approximately twice the explosive loading of their smaller contemporaries, and are intended for utilization in outdoor applications, in large buildings such as warehouses and aircraft hangers, and in tactical situations requiring an enhanced degree of effectiveness for the safety

of all concerned.

One of the most important safety rules to observe concerning the use of any type of exploding munition is NEVER to expose friendly personnel to the effects of the full power Stun Grenades. No matter how well these grenades are designed and manufactured, there is always the possibility of a malfunction of some type. Or, more likely, the explosion may occur close enough to some other object to propel it with the chance of harmful results. This potentially dangerous situation is known as Secondary Fragmentation. Knowledgeable officers do not test their body armor by wearing it while it is being shot. Neither should they be exposed to potential injury, remote though the chance may be, by needlessly placing themselves in harm's way when training, testing or using the full power stun grenades.

An equally important Safety Rule is to ALWAYS have adequate Medical and Fire Suppression Support immediately available anytime Stun and/or Diversion/Distraction Grenades are used, either in training or in actual tactical operations.

It is also highly recommended that any potential user of these unique, life-saving SPLLAT Munitions make arrangements to attend one of the User Certification Courses that are offered by Accuracy Systems Ordnance Corp. PO Box 41454, Phoenix, AZ 85080. Telephone (602) 433-9375 or FAX (602) 433-9375.

Not only will the student receive a good basic training in the safe and proper techniques to use when employing SPLLAT Munitions, but graduates will also receive a Certificate from the factory stating that the Graduate has been properly trained by the Factory Experts in the Safe and Proper Tactical Utilization of SPLLAT Munitions.

In any event, today's modern tactical officer should always remember it is no longer necessary to shoot and kill a suspect.

In fact, today's SWAT Motto should be:

"DON'T SHOOT 'EM - SPLLAT 'EM"!

Charles M. Byers PO Box 41454 Phoenix, AZ 85080

FIRE-ANT & LADY-BUG

Stealthy High-Mobility Vehicles for Transport by CV-22

NEED FOR THE NEW SYSTEM

CHANGE OF 'ENEMY' : A VARIETY OF NEW ADVERSARIES
The post-cold-war opponent offers no predictability of the nature, timing, terrain or intensity of conflict, from battles to humanitarian missions.

VARIETY OF LOCATIONS : NEED GLOBAL DEPLOYMENT AT SHORT NOTICE
Flashes can occur anytime, anywhere, needing rapid deployment and air transportation.

VARIETY OF BATTLEFIELD TERRAIN
The opponent can hide in or move through forests, meadows, deserts, beaches, rivers, snow fields, ice packs, marshlands, farmlands, villages and urban areas.

NEED FOR A VARIETY OF MACHINES
Tanks and big IFVs are too large for maneuvering through forests and urban areas, have ground pressure too high for marshes, are too heavy to be amphibious or be supported over low-load bridges in the Third World, and have tracks that are not designed for long-distance drives over roads. Also, tank-like vehicles are somewhat immune to heavy machine guns and artillery, but have no protection against inexpensive, light-weight, shoulder-fired missiles.

SHRINKING DEFENSE BUDGETS : NEED FOR LOW-COST SYSTEMS
Budgets allow fewer types of vehicles, exactly opposite to the needs of the new, diverse battlefields. Versatile vehicles with interchangeable modules are a low-cost alternative.

COASTAL MINES ARE A MAJOR CHALLENGE : THE CV-22 IS A SOLUTION
Under the OMFTS plan, helicopters and tilt-rotor aircraft can transport men and materiel directly from off-shore ships to the battlefield, rapidly over the surf and out of danger from coastal mines.

MOBILITY GAP FOR THE CV-22 SYSTEM
The CV-22 Osprey provides excellent mobility - 2000 miles at 360 mph. However, once disembarked, the mobility of the troops is reduced to walking speed - 4 mph! And the equipment becomes dead weight. The Fire-Ant and Lady-Bug fill this mobility gap.

Solution : Fire-Ant and Lady-Bug Family of Vehicles

The Fire-Ant + Lady-Bug look like an improved version of Sweden's Hagglunds Bv-206, with electric drive, smaller size, lighter weight, improved protection by modular armor, improved mobility and greater flexibility of operations.

Compact Size for MOUT / MOBA

Fire-Ant + Lady-Bug are small enough to maneuver through narrow streets in the third world, enabling military personnel to operate from an armored vehicle rather than walking around on foot, for greater effectiveness and safety.

Size Ideal for Small Teams

Fire-Ant + Lady-Bug accommodate 4/8 man teams/squads, and 6 - 8 man reconnaissance or assault platoons, and carry their weapons and provisions for 3 - 7 day missions.

High Mobility

Wheels for High Speed, Quick-Install Tracks for High Flotation

The vehicles use wheels for high speed travel on dry roads. For mobility over soft terrain, the outboard wheels are removed, and reinstalled, with D-STAR Silent Mover Area-Ruled Tread (D-SMART) tracks with central lugs between the wheels.

Variable - Ride - Height Active Suspension

The vehicles use hydro-pneumatic variable-height suspension, and tuck in their legs for loading into CV-22 and CH-53E. The suspension offers automatic leveling for stability, fully-active operation for smooth riding, and a relatively stable platform for greater precision in sensing and targeting.

Amphibious Operation

Amphibious vehicles can cross and travel on rivers and streams in forested territory. They can self-deploy from ships in calm seas (being ferried by CV-22 / CH-53E in rough seas). Propulsion is by twin-contra-rotating Archimides' screws, for several knots speed over water as well as enhanced mobility through soft mud and snow.

Light Armor for Base Vehicles, Add-On Armor when Needed

Due to CV-22's payload limits, thin-shelled versions of the vehicles are to withstand only small-arms fire. Additional armor panels and bricks can be attached quickly by Velcro-bonding or by soft-stick adhesives.

Compact Dimensions for Transportability

- Thin-Shelled version : for transportation inside a CV-22.
- Up-Armored versions : for transportation under-slung from CV-22s, or carried inside CH-53Es, or carried inside ISO containers.

STEALTHY DEPLOYMENT

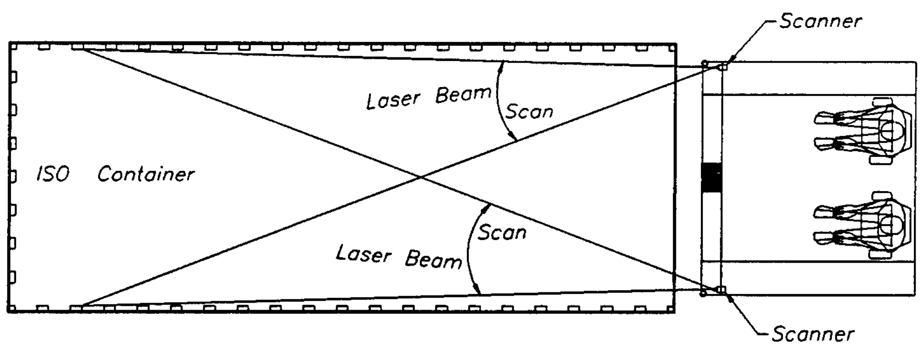
Stealthy Pre-Positioning
Fire-Ant and Lady-Bug vehicles can be shipped in standard ISO inter-modal containers (3 vehicles per 40 ft. container); pregnant containers being similar to millions of other ISO containers in transit at any time. After pre-positioning, an airborne force can land near the containers and drive away to the conflict site.

Stealthy Transportation
The vehicles can be transported inside standard highway tractor-trailers, without attracting media coverage or alerting the opponent.

Rapid Deployment
By C-17 (each with 21 thin-shelled or 14 up-armored vehicles), LCAC (22 thin-shelled or 16 up-armored vehicles), the CH-53E (2 up-armored vehicles), and the CV-22 Osprey (2 thin-shelled vehicles, with add-on armor).

OPERATIONALLY SIMPLE LOADING AIDS

A vehicle's width controls interior space, stability and maneuverability. To load widest possible vehicles into CV-22 and other carriers, the Fire-Ant and Lady-Bug use a new Distance Mapping & Automated Positioning System.



A scanning laser on each corner of the vehicle measures distances to all obstacles ahead. An on-board computer builds stereo image of space ahead, calculates vehicle position relative to walls, and provides driver with Go/No-Go decision aid and steering guidance. DMAPS can also <u>auto-load</u> vehicles, is more precise than human judgment, allows maximum vehicle width, reduces manpower needs for loading, permits faster loading, and reduces risk of damage to vehicles and transporter.

LIGHT WEIGHT FOR TRANSPORTABILITY, SELF-DEPLOYMENT OVER SMALL ROADS

CV-22 has a design maximum payload of 20,000 lbs internal, or 15,000 on external hooks. For adequate range, payload is normally limited to 9,000 - 13,000 lbs. The CH-53Es can carry 18,000 lbs. Even heavier weights are permissible for the inter-modal containers.

DIMENSIONS AND WEIGHTS (PRELIMINARY ESTIMATES) :

Thin-Shelled Vehicles (each)
11'10" long, 65" wide, 66" tall (suspension tucked in);
5000 lbs gross weight.
Internal carriage of 2 vehicles in a CV-22.

Up-armored vehicles (each)
13' long, 84" wide, 68+" tall (suspension tucked, roof armor added after unloading).
7500 lbs gross weight.
Internal carriage of 2 vehicles in CH53E.
Vehicles can be slung externally on CV-22s, and fit inside ISO containers.

COMPACT, LIGHT-WEIGHT, HIGH-POWERED JP8 ENGINES

An example is the D-STAR Diesel in Phase II development with NASA funding, with Southwest Research Institute as the STTR research partner. The D-STAR Diesel makes 300 hp from a 180 lb, 21" diameter, 30" long package, and operates at high speeds optimal for driving electric generators for hybrid-electric vehicles.

ELECTRIC DRIVE FOR VERSATILITY

- *Flexibility of Design, Better Use of Internal Space.*

- *Flexibility of Load Transfer.* The Fire-Ant has a 300 hp super-turbo-flat-six-cylinder D-STAR Diesel; the Lady-Bug has super-flat-twin 40 kW APU version of the engine. With power transfer between Fire-Ant and Lady-Bug, both can be driven even with one engine dead.

- *Operation in Stealth and Super-Stealth Modes* : The vehicles can operate on a battery for super-stealth. Or, both vehicles can be operate on the low-observable APU while preserving long range / endurance.

- *Interface with Electric Powered Weapons* : Electro-Thermal and EM Rail Guns, Laser/Beam Weapons, Electronic Warfare and Electro-Magnetic Armor.

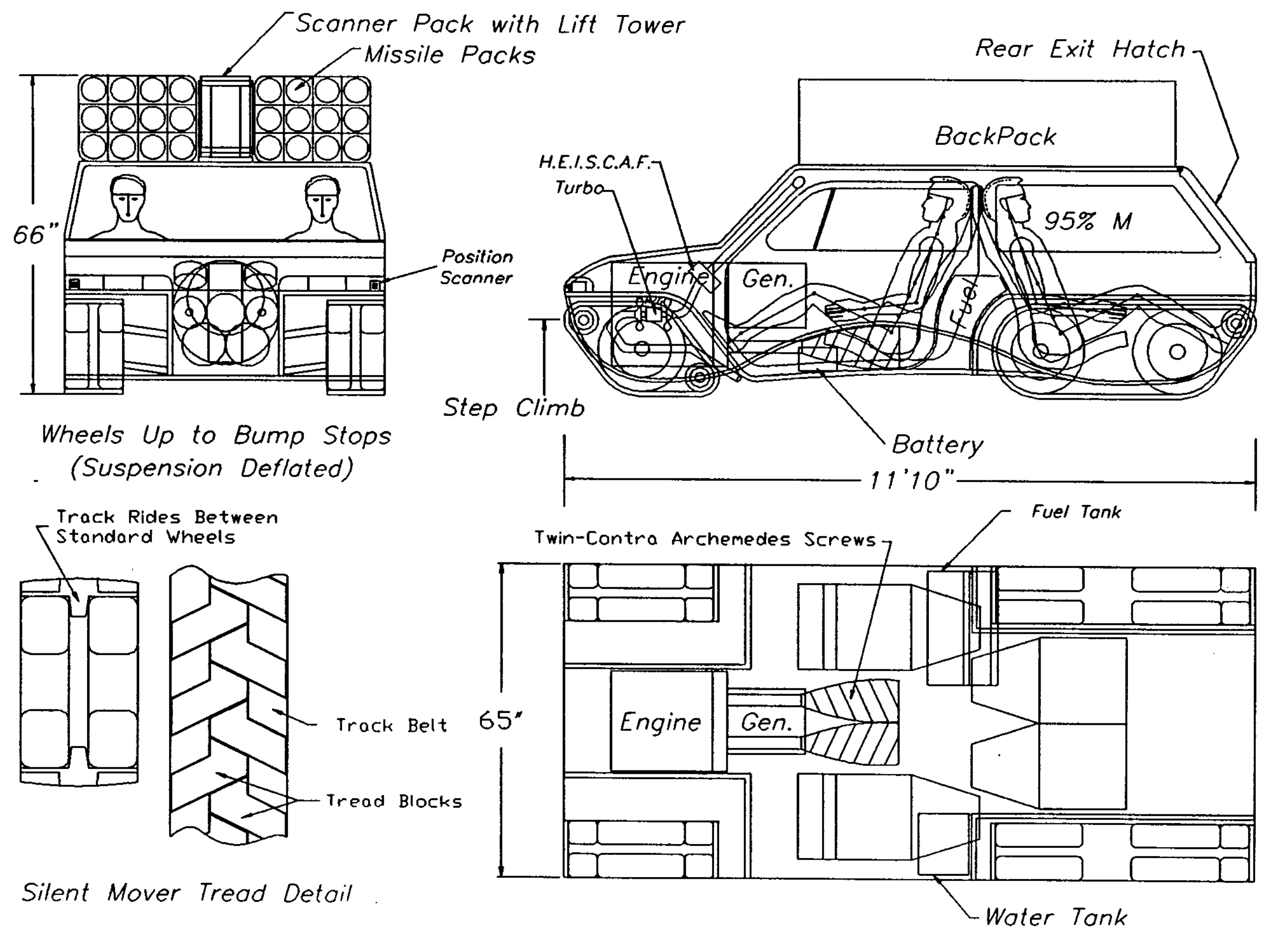
- *Use as a Field Generator Set.* The electric-drive vehicles can provide primary or standby power for field units, e.g. local headquarters and field hospitals.

- The engine can operate at constant speed, regardless of vehicle speed, for improved efficiency and better control of NVH.

- The engine is mechanically disconnected from the wheels, and hence isolated from shocks and transient overspeeds during cross-country operation, for longer engine life.

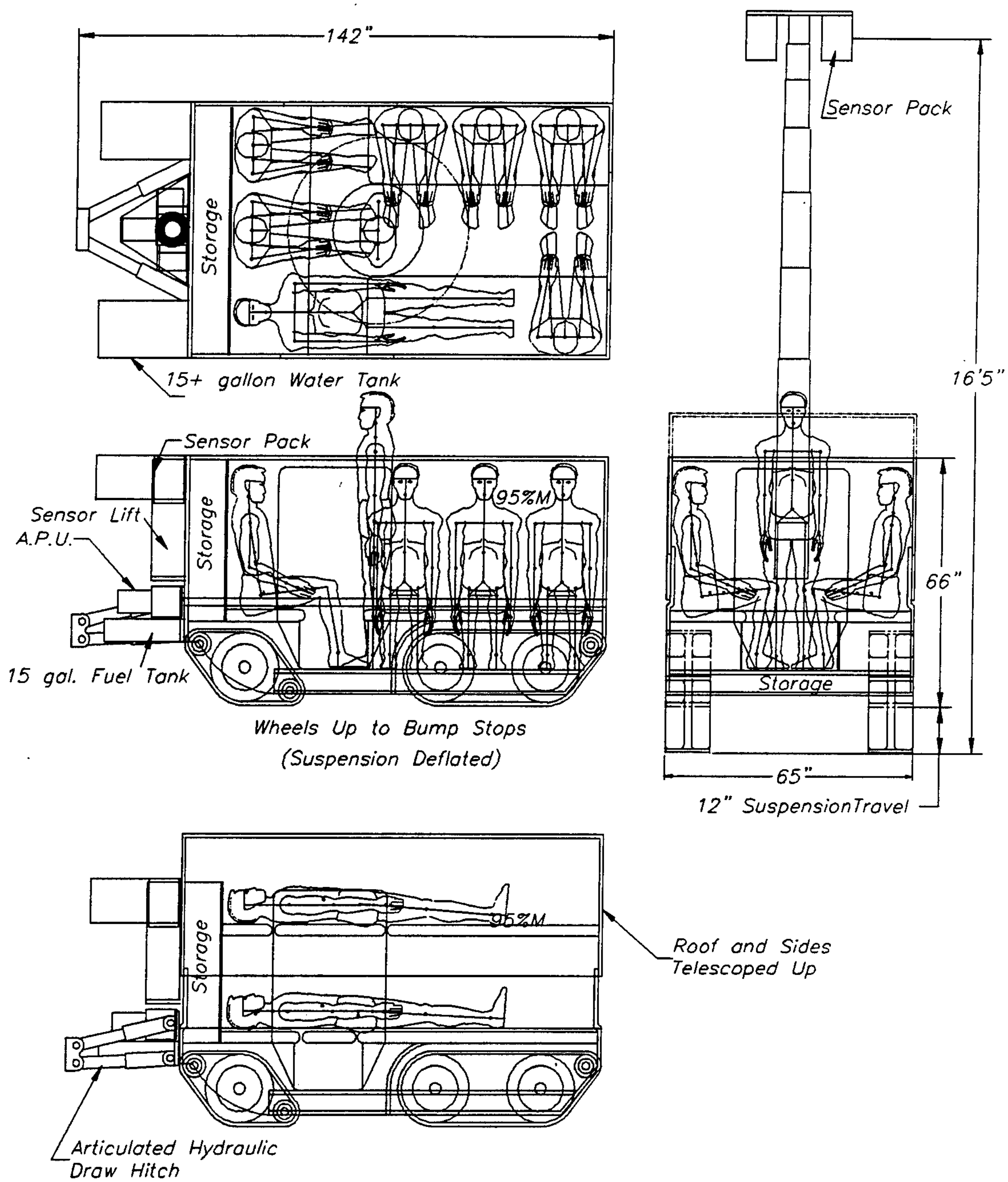
Fire-Ant & Lady-Bug High-Mobility Vehicles

Fire Ant



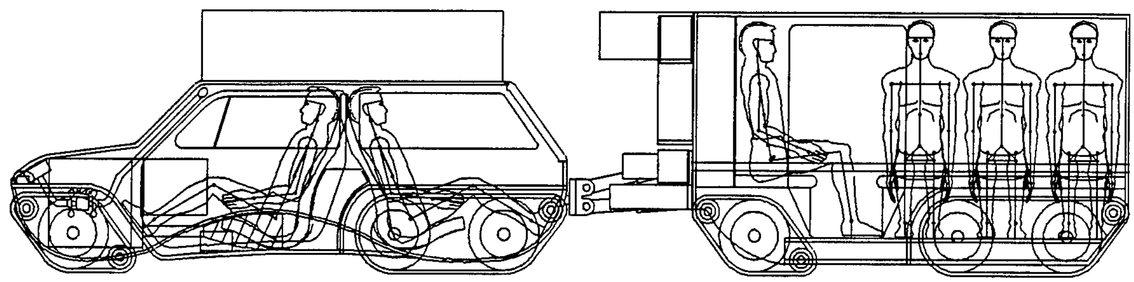
Fire-Ant & Lady-Bug High-Mobility Vehicles

<u>LADY-BUG</u>

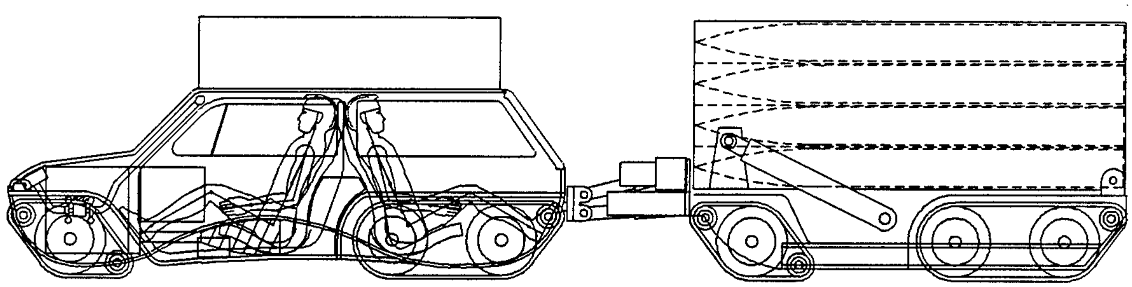


Fire-Ant & Lady-Bug High-Mobility Vehicles

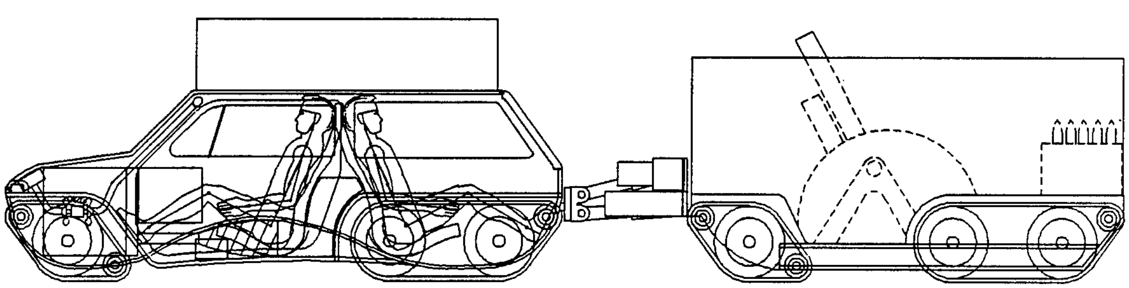
<u>Optional Configurations</u>



Troop Transport



Missle Launcher



Mortar Transport

Alternative Species of the Lady-Bug

Lady-Bugs can be used alone, and can be daisy-chained. Potential versions include :

- Armored Personnel Carrier
  - Standard-length carries a squad of 9 troops (+ 4 in Fire-Ant).
  - Double length (≈ 24 ft.) Lady-Bug can accommodate 18 troops.
- Light Gun Carriage : Various guns and turrets.
- Anti-Aircraft Battery : Vertical, tube-launched missiles against helicopters, aircraft.
- Anti-Tank Battery : Horizontal, tube-launched missiles in elevating box.
- Command-Control Unit / Mobile Headquarters
  - Standard length : C4I facility. Double length : field-mobile headquarters.
- Light-Armored Ambulance / Field Hospital
  - Standard length : 4-bunk ambulance. Double length : mobile mini-hospital.
- Construction & Repair Units
  - Modular arrangement allows various service attachments.

Modularity : Enhanced Survival, Low Initial & Operating Costs

Modular construction lowers fleet costs by using mass-produced common modules for various vehicles, acts as a force-multiplier, and allows salvage-exchange of modules in the field. Vehicle pairs can remain operational with one module disabled, and usable modules from disabled vehicles can be combined into 'good-as-new' vehicles.

Conclusion

The Fire-Ant and Lady Bug will meet the USMC and SOF needs of stealth, mobility and flexibility. The vehicle concepts can be rapidly converted to virtual and real prototypes for testing. Lockheed Martin Controls Group will team with D-STAR to develop the electric drive system for the vehicles, and University of Delaware - Center for Composite Materials will help develop the composite structure and armor for the vehicles. Other specialist groups will be invited to join the project as needed.

For Additional Information

Please contact Mr. S. Paul Dev at D-STAR Engineering, (203) 925-7630.

Please visit our booth (#228) at the ADPA SO/LIC Exhibition.

2

THE IMPACT OF CV-22 ON FUTURE SOF MOBILITY REQUIREMENTS

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Directorate of Plans, Policy, and Strategic Assessments, Requirements Division
MacDill AFB, Florida
7 January 1997

INTRODUCTION

The CV-22 will have a great impact on special operations forces (SOF) and the way SOF missions will be executed. The fielding of the V-22 will change Department of Defense (DoD) and U.S. Special Operations Command (USSOCOM) capabilities and the tactical doctrine of the forces that employ the aircraft. The V-22 will be a force multiplier. It will enhance USSOCOM's ability to perform SOF missions as a result of its speed, longer range, and ability to rapidly deploy with a significantly reduced logistics "tail." The V-22 combines the advantages of both helicopters and fixed wing aircraft, and as a result will also lower the total number of airframes required in the force mix. This translates to direct savings in procurement and organizational and maintenance costs. The V-22 is well suited to USSOCOM's missions and will become a valuable addition to DoD's and the Command's aircraft mix.

THE V-22 OSPREY

The V-22 "Osprey" is a tilt-rotor aircraft that combines the vertical take-off, hover, and vertical landing qualities of a helicopter and combines that with the long-range fuel efficiency and speed of a turboprop fixed wing plane. Current plans call for Bell-Boeing to build 523 V-22s of three variants for the Department of Defense: 425 MV-22s for the U.S. Marine Corps; 50 CV-22s for the Air Force Special Operations Command (AFSOC), a component of U.S. Special Operations Command; and 48 HV-22s for the U.S. Navy. The Marine Corps plans to use their aircraft to replace the aging H-46 helicopters, and the MV-22s will perform roles in combat support and assault support operations. AFSOC plans to use the CV-22s to support USSOCOM's missions, and the Navy will use their HV-22s for Combat Search And Rescue (CSAR), special warfare support, and fleet logistics support.

The V-22 will be capable of speeds from zero to over 300 Knots Indicated Airspeed (KIAS), with a cruise of 235 KIAS. The V-22 will be capable of carrying 8000 pounds of cargo. The cargo compartment is large enough to carry a small vehicle and trailer, or two half pallets, or 24 combat equipped Marines, or 18 Special Operations Forces (SOF) operators (Ranger, Special Forces, SEAL, or Special Tactics) and their gear. The extra weight of the SOF gear reduces the CV-22 personnel capacity. The V-22 will be air

refuelable by both low and high speed tanker aircraft. The Osprey will be shipboard compatible, be capable of precision navigation, and be able to operate in almost any climate. A V-22 will include secure radios, Global Positioning System (GPS), a Forward Looking Infrared (FLIR), its own oxygen generating system, and other features that make it a very capable aircraft for a wide variety of missions.

The CV-22 variant will add many features to the basic V-22 to tailor it to the SOF mission. The CV-22 variant adds a multifunction advanced terrain-following terrain avoidance (TF/TA) radar, extra fuel tanks for an extended range, an advanced Electronics Warfare (EW) suite to include radar and infrared jammers, flares and chaff, and laser warning. The radar allows the CV-22 to penetrate adverse weather and the EW suite gives the SOF variant more protection so it can avoid detection and penetrate unfriendly skies.

The Marine Corps will begin receiving their MV-22s in the year 2000, with the first operational units ready by 2002. AFSOC will begin receiving their CV-22s in 2003, and complete delivery of all 50 by 2010. The fielding of these aircraft and the capabilities they will bring will enhance USSOCOM's ability to perform National Command Authority (NCA) and other tasked missions.

ADVANTAGES OF THE V-22

The V-22 aircraft offers many advantages, with both the aircraft itself and the logistics needed for support. The V-22 combines the speed and range of a turboprop plane with the vertical takeoff and landing capability of a helicopter. The biggest advantage this offers is the ability to exfil at the same long ranges typically associated with fixed-wing infil platforms. The advantages combined can translate into a reduced number of mission aircraft required because it performs in both aircraft roles while needing less maintenance. USSOCOM plans to replace nearly 100 older aircraft (fixed and rotary wing) with the acquisition of its 50 CV-22s.

Another advantage of the CV-22 is on the logistics, or support side. Two of the key advantages are its self-deployment capability, and the portability of its support equipment, or "tail." The long range tanks and air refueling probe on the CV-22 allow it to fly and deploy almost anywhere without breakdown and buildup, and in a very short timeframe. For example, the CV-22 can fly from California to Hawaii in eight hours. It can fly from Europe and reach most parts of Africa in less than a day. The CV-22 Joint Operational Requirements Document (JORD) calls for it to utilize smaller, state-of-the-art equipment and testers. The requirements specify that most of the test equipment must be two-man portable. Further, the equipment required to support the four-ship CV-22 deployment package for 30 days must be able to fit in five C-141 loads (or equivalent). Currently, this is a big reduction from the four C-5s and seventeen C-141s that a four ship MH-53 deployment requires. This reduces the logistics "tail" to service and maintain the aircraft, as well as the associated costs.

THE CV-22 -- CASE EXAMPLE

The Non-combatant Evacuation Operations (NEO) from Liberia last April illustrates how these features might have been used by USSOCOM. On April 10, 1996, two MH-53's arrived in Monrovia, Liberia, and began to conduct a NEO of some 400 Americans and others. In the next two weeks, other helicopters and fixed wing aircraft arrived, to evacuate about 2000 people from Monrovia. Since C-130's could not land at the capital, helicopters flew there to pick up the evacuees and transported them to the Intermediate Staging Base (ISB) at Freetown, Sierra Leone. The evacuees were then flown to Dakar, Senegal by C-130. The CV-22 could have done this mission much more effectively with its long range and ability to take-off and land vertically. Had the CV-22 been available, the Osprey would have been able to reach the objective area in one day. Further, it would not have required the C-5 support necessary to deploy and redeploy the large helicopters. Further, the ISB at Freetown would not have been necessary with the CV-22's ability to land in Monrovia and reach Dakar. Clearly, the CV-22 would have saved time and money and performed the same mission more effectively than the current resources available to execute the NEO.

THE IMPACT OF CV-22 ON SOF REQUIREMENTS

While the CV-22 offers many advantages and will save money, it has some drawbacks and concerns that will need to be addressed and will drive other SOF requirements. The design of the V-22 was limited by the Marine Corps concept and the available technology at the inception of its development. A major limitation is its size. In order to be shipboard compatible and fit on Navy helicopter carriers, the V-22 design is smaller than optimum. The rotors had to have about nine feet clearance from the superstructure, and the outboard wheel had to be a foot from the ship's edge. These design constraints led to a smaller aircraft and cargo compartment, which restricts the V-22's capabilities to perform missions that require larger vehicles, loads, or equipment. This necessitated development of other SOF requirements for specialized equipment, such as the Light Strike Vehicle (LSV), and self-inflating Combat Rubber Raiding Craft (CRRC) due to the limited size of the cargo area.

The CV-22 will be well suited to many missions, and a cost effective addition to the USSOCOM aircraft mix. The Special Operations variant CV-22 will be even better suited to do some of these operations than its MV-22 counterpart because of its extra range, enhanced EW suite, and TF/TA radar. SOF missions can utilize the CV-22's range and speed, its vertical takeoff, hovering, and landing capabilities to perform long range precision infiltration and exfiltration through adverse weather and medium threat environments -- all in one period of darkness, and at a lower cost than current air vehicles. The CV-22's operational concept will need to be further explored, tactics changed, combined with new materiel requirements to take full advantage of the aircraft's capabilities.

CONCLUSION

The CV-22 will be aptly suited for a wide variety of USSOCOM missions. The speed and range of the CV-22, an advanced EW suite, the multifunction TF/TA radar will enable forces to fly deep, defeat the threat, and complete missions in one period of darkness. The aircraft's capabilities combined with the reduced logistics tail and support equipment needed to support a CV-22 deployment reduce the costs while increasing mission response and effectiveness. Many areas and requirements will still need to be refined as the CV-22 is fielded and the operational concept is fleshed out. Changes to tactics and procedures may be necessary, but these may further expand mission areas the CV-22 can perform. These changes though will bring a more cost efficient and effective way for USSOCOM to meet the challenge in the next century.

CASPER : 'THE GHOSTLY FRIEND'

Stealthy, Modular, Multi-Role Vehicle (FCV / RSV)

IMAGINE ... A MISSION SCENARIO

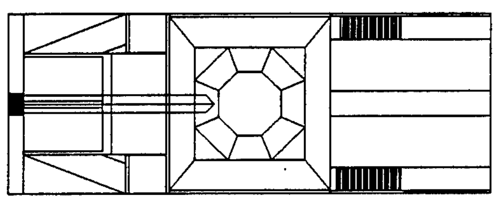
It's a dark and windy night in a rogue nation. A C-17 is flying non-stop (with in-flight refueling) from the U.S. toward the rogue nation. Fifty miles from the objective, the rear cargo ramp opens, and eight battle-ready Caspers slide out behind the C-17. Slung under the wings of DRAGONs (Deployable Ram-Air Glider with On-Board Navigation), using GPS+, the Caspers glide silently toward a targeted lake, river or sea. They plop down into the water, with 'legs' extended to help absorb shock. Carrying guns, cannons, missiles, EW suites or personnel, Caspers swim fast toward the land, ready to do their job.

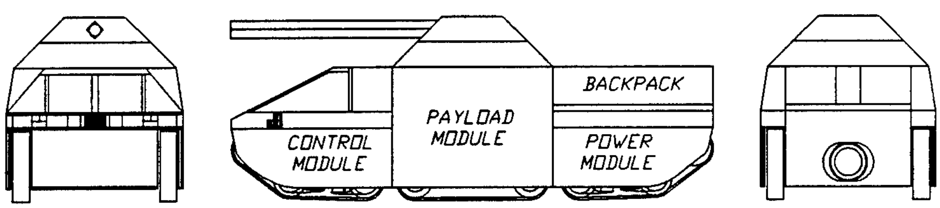
Meanwhile, hundreds of Caspers are emerging out of pre-positioned inter-modal ISO containers, having been shipped stealthily, mixed with millions of other ISO containers in transit worldwide. Additional Caspers are moving stealthily on roads, packed inside trailers behind standard highway trucks.

At the front-line, battle commanders are custom designing their task force, mixing and matching Casper modules to meet the needs of the day.

CASPER FCV / RSV

MODULAR VEHICLE LAYOUT





A typical Casper vehicle may have four modules. The Control Module has a crew of two, plus one jump seat, electric-drive sprocket motors plus road-wheel motors, and an optional APU, some fuel and a battery. The Power Module houses two compact, powerful engines, one water-jet, fuel, main electric power conditioners, sprocket motors and road-wheel motors. The Payload Module may have a turret, missiles, personnel carrier, C4I system, EW suite, or other features. The Back-Pack Module houses an elevating platform with scanning sensor pack, as well as two missile pods on an elevating-sluing platform, or two stretcher packs (LSTATS).

COMPACT DIMENSIONS

Length : 19 ft. 6 in. with 3 modules, 78" per module. Fits inside 20 ft. ISO container.

Width : 84". Fits inside ISO, CH-53E, 2-abreast in C-17, 3-abreast in LCAC, using new DMAPS : Distance Mapping and Auto-Positioning System.

Low profile height : 63" -- 75" at minimum ride height, depending on modules.

Pivot Steering the Narrow Vehicle : The vehicle is relatively slim, for maneuvering through narrow streets and forests.. But, pivot steer is feasible by use of adjustable ride-height, and non-uniform ground pressure, by tucking in the fore and aft ends of track.

LIGHT WEIGHT

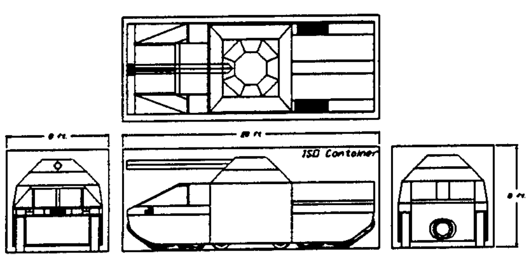
Air-Portable Caspers : 18,000 lb. Gross, with light armor. Additional armor bricks can be attached quickly by Velcro-bonding or by soft-stick adhesives. This allows 1 Casper in CH-53E, 8 Caspers per C-17, 8 to 9 per LCAC.

Ground-transportable Caspers : up to 30,000 lb, With applique' armor, extra payload. Allows 2 Caspers per 40 ft. ISO container.

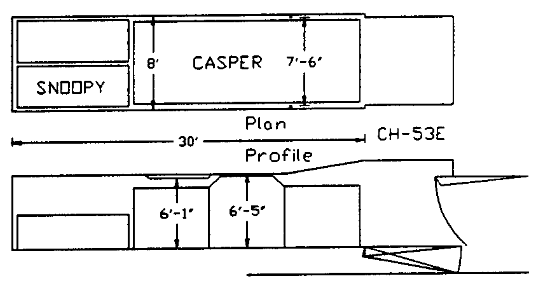
Weight Allowances : Control Module : 5000 lb (with 9 psf composite armor)
Power Module : 3000 lb (unarmored), Back Pack : 2000 lb.
Payload Module : 5000 to 8000 lb.

TRANSPORTABILITY IN ISO CONTAINER, CH-53E, C-17, LCAC

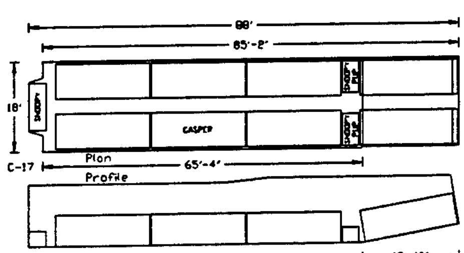
1 Casper in 20 ft. ISO container



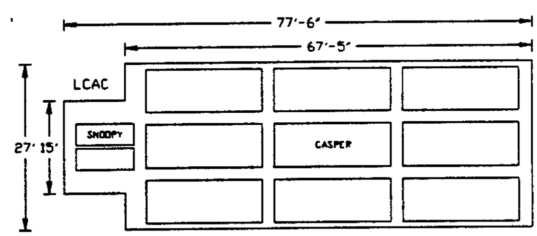
1 Casper in CH-53E



8 Caspers in C-17



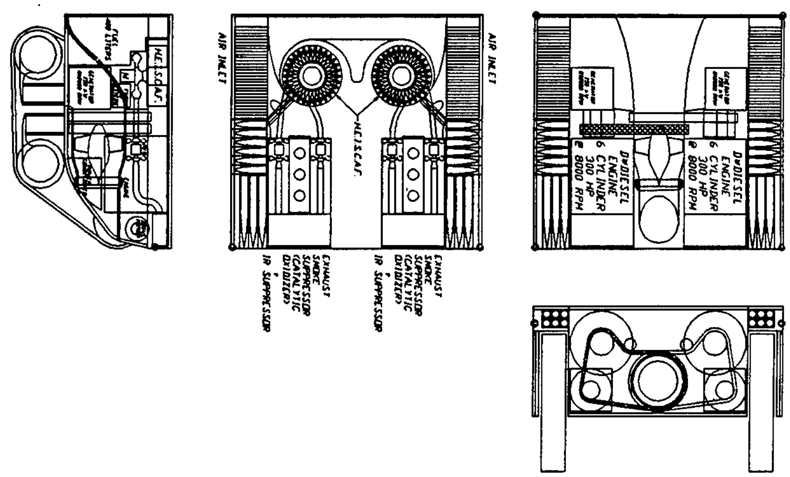
9 Caspers in LCAC



HIGH MOBILITY : Attained through the synergistic combination of several features :

High Power/Weight Ratio
Casper uses 2 x 300 hp D-STAR Diesels in Phase II development with NASA funding, with Southwest Research Institute as the STTR research partner. Each engine package is only 21" diameter, 30" long, weighs only 180 lbs, and operates at high speeds optimal for driving electric generators for hybrid-electric vehicles.

Layout of Power Module



Wheels for High Speed, Quick-Install Tracks for High Flotation
The vehicle uses wheels for high speed travel on dry roads. For mobility over soft terrain, the outboard wheels are removed, and reinstalled, with D-STAR Silent Mover Area-Ruled Tread (D-SMART) tracks with central lugs between the wheels. The ground pressure with tracks is a modest 8-10 psi, and allows enhanced mobility over mud and snow.

Amphibious Operation
Amphibious vehicles can cross and travel on rivers and streams in forested territory, and can self-deploy from ships in calm seas (being ferried by CH-53E & LCAC in rough seas). Casper is propelled over water by a large water jet in the Power Module, driven by dual toothed belts from the two engines. To reduce drag while swimming, the vehicle tracks are operated by electric road-wheel motors. Speed differential between the track motors is used for steering the vehicle. The water-jet may also use a steering-reversing nozzle.

Variable - Ride - Height Active Suspension
The vehicle uses hydro-pneumatic variable-height suspension, and tuck in their legs for loading into CH-53E. The suspension offers automatic leveling for stability, fully-active operation for smooth riding, and a relatively stable platform for greater precision in sensing and targeting, and allows pivot-steering for the narrow vehicle.

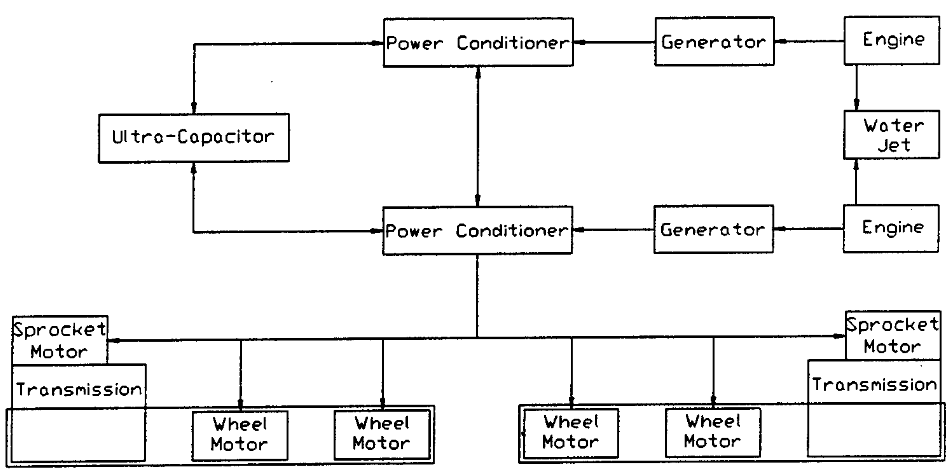
OTHER FEATURES & SYSTEMS : Casper uses systems for mechanical coupling and accommodation of misalignment and tolerances, automated inter-module relative alignment, electric power transfer and electronic data transfer, local area network control, module 'plug-and-play', remote control using Slingpad computer, and Distance Mapping & Automated Positioning for precise loading of vehicles into transporters.

ELECTRIC DRIVE FOR VERSATILITY, OTHER ADVANTAGES

- *Flexibility of design, better use of internal space.*
- *Flexibility of Load Transfer.* Casper has 2 x 300 hp D-STAR Diesels; plus the Control Module may have a 15 - 40 kW APU. Any of the engines or APU can provide power to any of the motors or other electrical loads. Hence the vehicle remains fully operational even with one engine dead.
- *Operation in Stealth and Super-Stealth Modes* : Casper operates on a battery for super-stealth, or on the low-observable APU for stealth with long range / endurance.
- *Interface with Electric Powered Weapons* : Electro-Thermal and EM Rail Guns, Laser/Beam Weapons, Electronic Warfare and Electro-Magnetic Armor.
- *Use as a Field Generator Set.* Electric-drive vehicles can provide primary or standby power for field units, e.g. local headquarters and field hospitals.
- The engines can operate at constant speed, regardless of vehicle speed, for improved efficiency and better control of NVH.
- The engines are mechanically disconnected from the wheels, and hence isolated from shocks and transient overspeeds during cross-country operation, for longer engine life.

The E-drive system consists of high-speed permanent magnet generators, an electrical power conditioner (IGBTs or MCTs), and permanent-magnet motors or induction motors. The vehicle has sprocket motors, which drive tracks through reduction gear boxes, and wheel-motors, which drive road-wheels. The system has potential for regenerative braking and steering, and for peak-power management by ultra-capacitors.

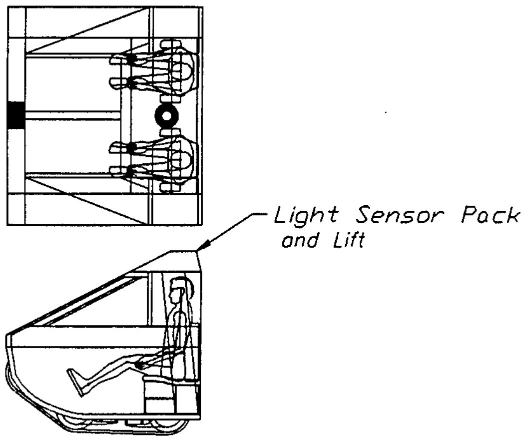
POWER-FLOW ARCHITECTURE



Max Acceleration : Sprocket Motors + Road Wheels
Cross - Country Cruise : Sprocket Motors only
On - Road Cruise : Road Wheels only
Amphibious Cruise : Water Jet + Road Wheels

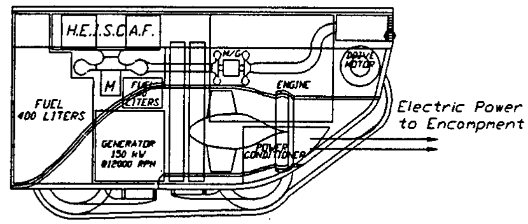
Variations of CASPER : Module Mix-and-Match

Control Module Only
(with Optional Sensor-Pack)



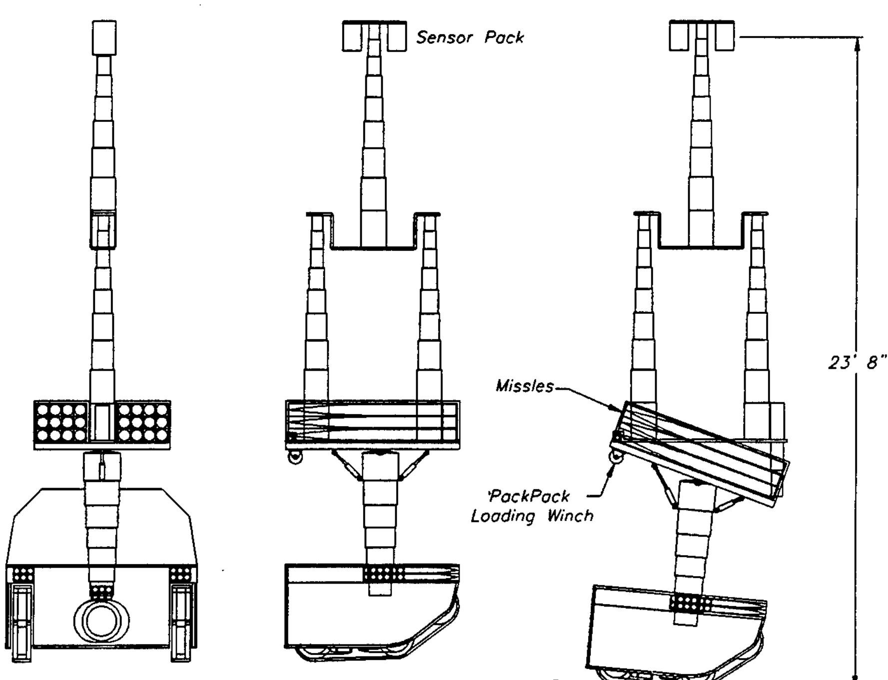
Use as hybrid-electric
Reconnaissance Scout Vehicle.
The APU provides cruise power,
batteries provide peak power.

Power Module Only



Provides power to an encampment.

Power Module + Back - Pack :
Provides Power + Air-Defense to an Encampment.



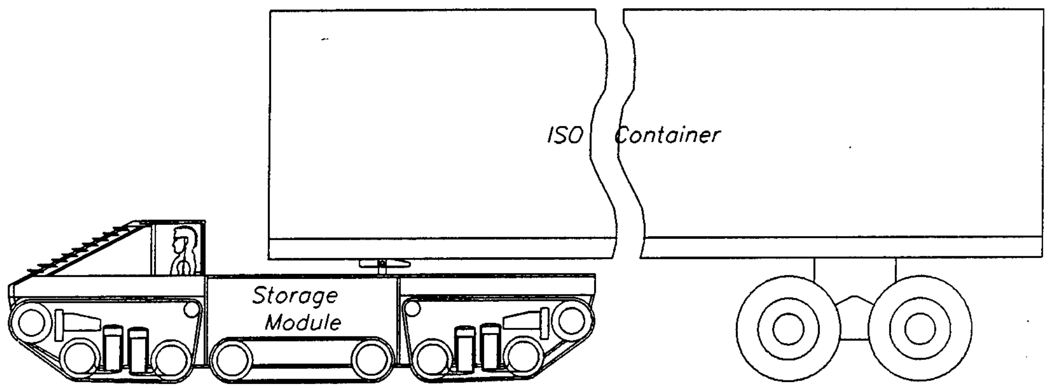
*Shown with Power Module on incline.
Missiles Raised to Launch Position
and Sensor Packs Vertical.*

CONTROL MODULE + POWER MODULE

TRACTOR / TUG

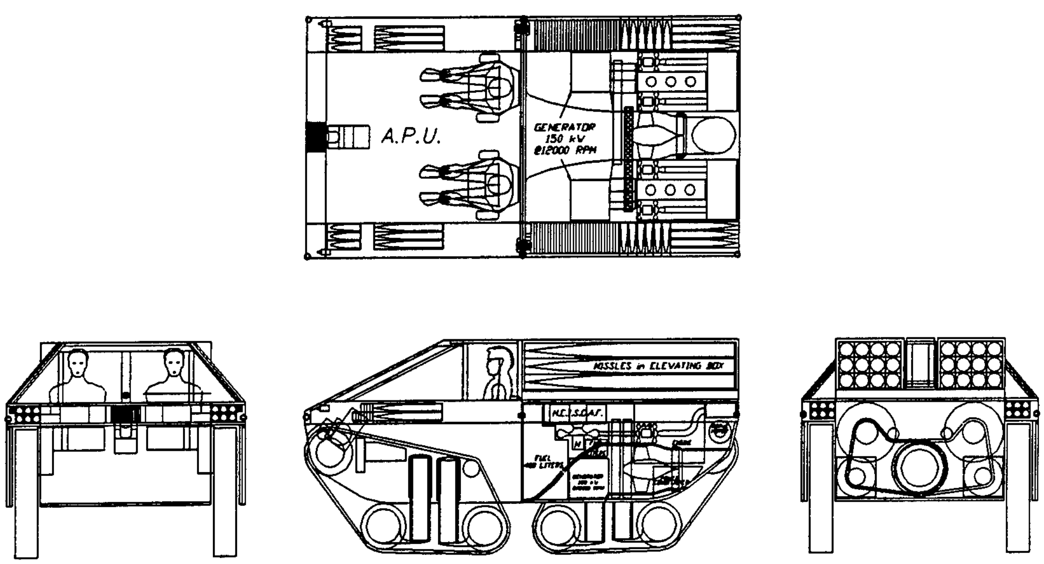
Can tow semi-trailers (with Storage Module and 5th-wheel attachment).
Can tow full trailers :

20 ft. trailers : APC (24 soldiers), C4I/EW, HQ, Medic Unit.
40 ft. trailers : APC shelter, C4I/EW, HQ, Hospital.



CONTROL MODULE + POWER MODULE + BACK-PACK

EXTENDED-RANGE RECONNAISSANCE SCOUT VEHICLE.

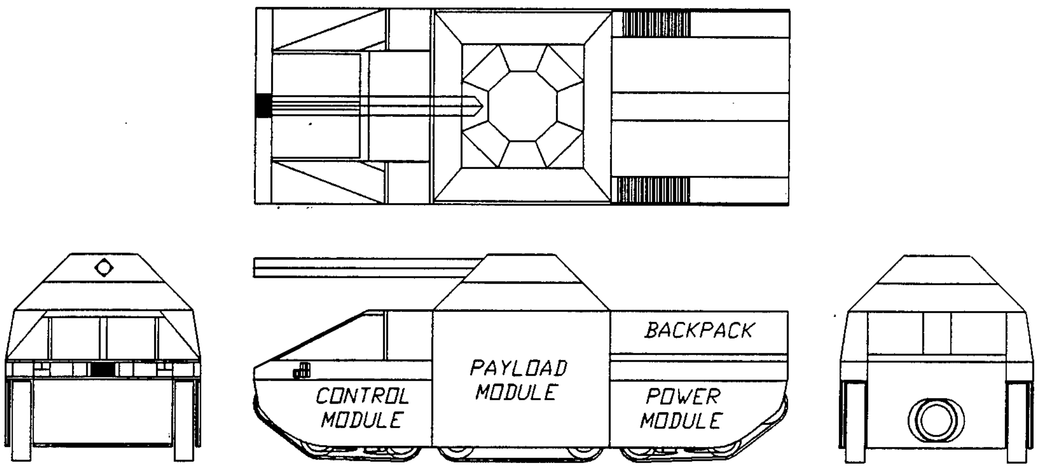


Shows Tracks and Wheels Lowered for Off-Road Use

VEHICLES WITH PAYLOAD MODULE

TURRETED VEHICLE

Can accommodate 54"-60" turret ring, with 2 crew in turret, 4 in Payload Module.

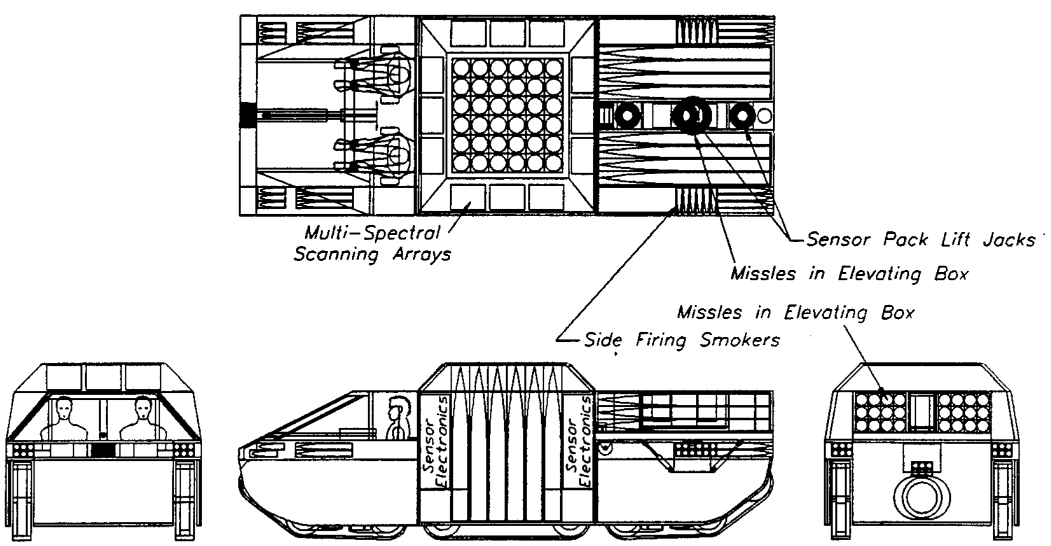


Turret types :

LARGE GUN (up to 90 mm), or 105 mm Low-Recoil.
MACHINE-GUNS : .50 cal guns with sensor pack.
ANTI-TANK Turret : with TOW+ Missiles.
AIR-DEFENSE Turret : with ADATS or other missiles.

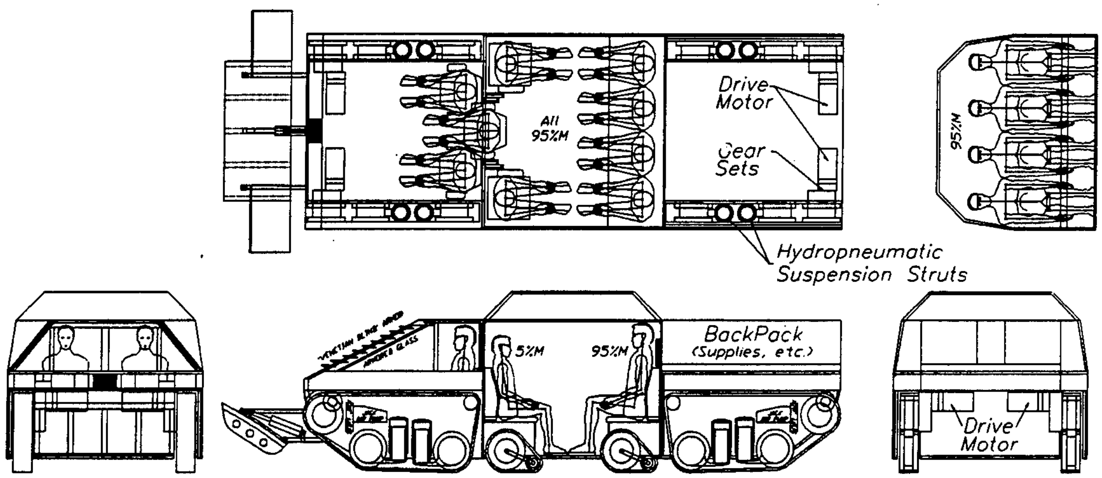
AIR-DEFENSE VEHICLE

Vertical missiles for Air Defense,
Phased-array radar / staring IR sensors on sloping plates on all four sides.



ARMORED PERSONNEL CARRIER

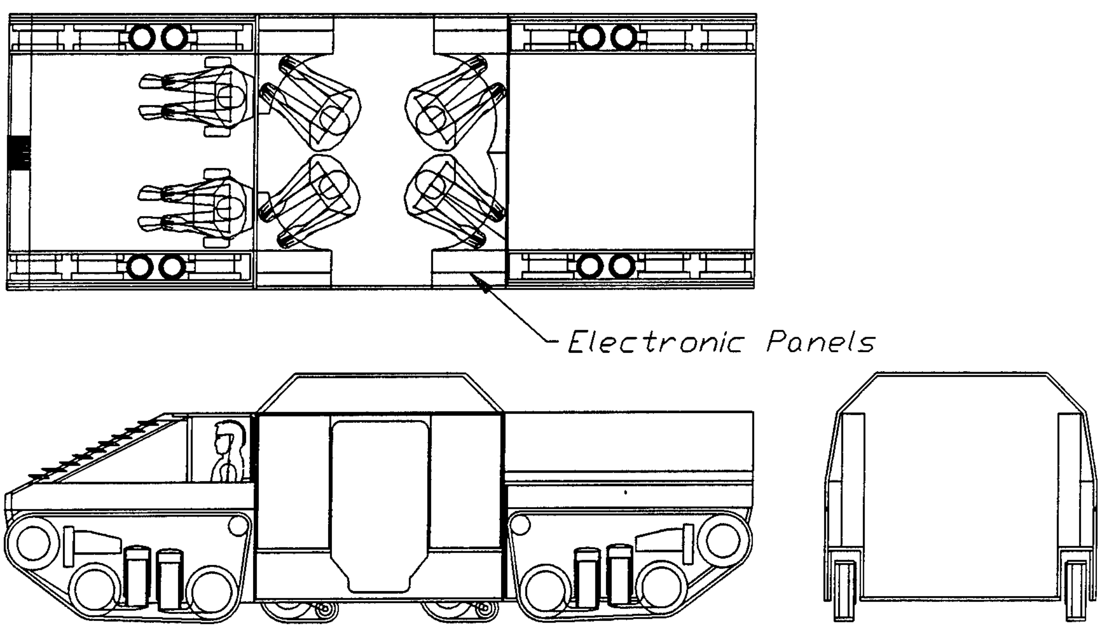
9-Man Squad in Vehicle.



Also shows Mini-Dozer Blade for Clearing Obstacles

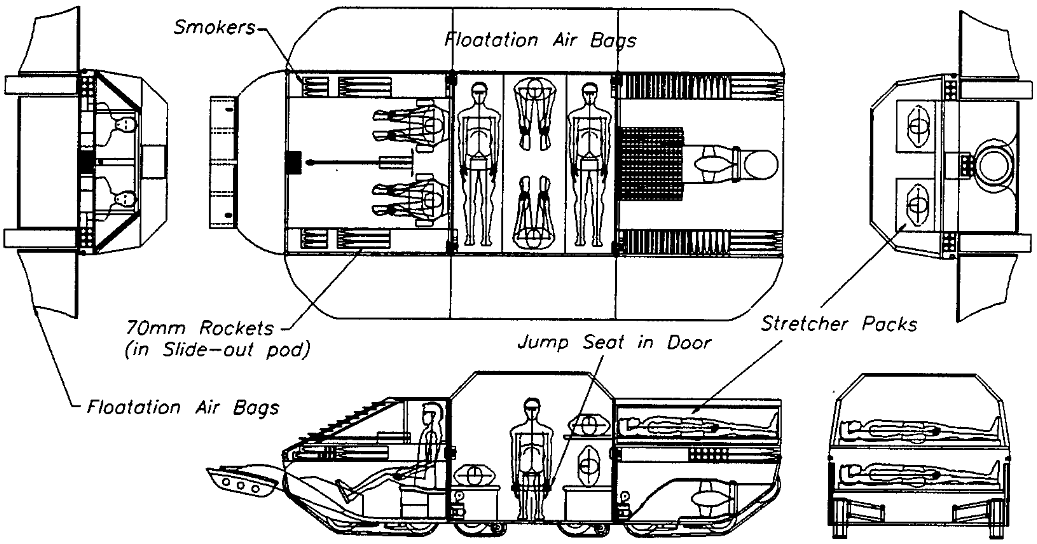
ARMORED C4I / EW VEHICLES

4 Persons in Payload Module, Space for Electronics.



ARMORED AMBULANCE / AMPHIBIOUS NIGHT WATCH OPERATION

Patients / Sleepers in Center Module + 2 Stretcher Boxes in Back Pack.



CONCLUSIONS

The Casper family of modular vehicles will meet the USMC and SOF needs of stealth, mobility and flexibility. The vehicle concepts are now ready to be converted to virtual and real prototypes for testing. Lockheed Martin Controls Group will team with D-STAR to develop the electric drive system for the vehicles, and University of Delaware - Center for Composite Materials will help develop the composite structure and armor for the vehicle. Other specialist groups will be invited to join the project as needed.

ACKNOWLEDGMENT :

Preliminary design of Casper was supported with Phase I funds from the Marine Corps SBIR program. The support of Mr. Michael Gallagher, Mr. Steve Ouimette and others at NSWC (Carderock) is greatly appreciated.

FOR ADDITIONAL INFORMATION

Please contact Mr. S. Paul Dev at D-STAR Engineering, (203) 925-7630. Mr. Steve Ouimette (COTR for the Phase I effort) may also be contacted at (301) 227 4219.

PLEASE VISIT OUR BOOTH (#228) AT THE ADPA SO/LIC EXHIBITION.

Civil-Military Operations and Civil Affairs: A vision for the future

Major Tim Howle

Civil-Military Operations (CMO) have played an increasingly significant role in military operations over the past five to seven years. As CMO increases in importance, commanders are requiring more extensive CMO and CA support and augmentation. This increase in required support to the maneuver commander, in conjunction with changes in the overall focus of CMO, demands a change in the way CMO are planned and executed. CMO can no longer be handled as an adjunct or follow-on mission. CMO planning must be included in **all operational planning**, from the initial phase through transition. The civilian dimension will continue to play a major role in all military operations.

CMO have always played a major role in military operations. During the conquests of Philip of Macedon and Alexander the Great, military forces relied on the local populace and economy for survival. The major difference was that these forces took what they needed without regard to its affects on the local populace. During WWII, the Army saw the need for a significant CMO presence and created a CA division. This division provided the manpower for the military government in Germany and also assisted in the conduct of the Marshall Plan and the rebuilding of Japan. One must remember that at this time there was no United Nations, USAID, UNDP, or significant numbers of NGOs, PVOs, or IOs. The military provided the only means of successfully completing these daunting tasks.

During the Vietnam War, CMO was again an important tool. The US appeared to understand the need to "win the hearts and minds" of the local populace. Unfortunately, this proved to be an overwhelming task in this protracted guerrilla war.

In the post-Vietnam period, CMO definitely took a backseat in military operations. The Cold War with the USSR and the Warsaw Pact nations dominated our military strategy. The "Fulda Gap" scenario, global warfare, nuclear warfare, mutually assured destruction (MAD) were the keys to military strategy and CMO played little or no role. We still see the effects of this today in the limited CMO staff sections of US military units.

With the fall of the USSR and the end of the Cold War, CMO has increasingly played a significant role in military operations. The impact of military operations on the civilian dimension must be considered. Any effects on this civilian dimension may prove costly to the US in the long run. Commanders must plan accordingly and ensure that they consider the civilian dimension in all planning efforts. This is the role of the CMO staff officer and section.

As we enter the 21st century, we must re-look our focus, force structure, and capabilities to meet the needs of the military commanders in their conduct of future military operations. There is no doubt that there is a need to increase the size of the CMO staff section at all levels from the battalion to the warfighting CINC headquarters. We must also create full-time CMO staff sections on all joint staffs. We can no longer afford to have these staff sections formed ad hoc as a follow-on activity. The CMO staff section is as important to the operational planning effort as are the operations, intelligence, and logistics staff sections. Certainly commanders will benefit from a robust CMO staff section. This section is responsible for the manning and operation of three distinct CMO cells that significantly contribute to the success of any mission.

The CMO cell (Main) is located with the Main CP and is the focal point for the inclusion of CMO into operational planning and mission execution. This is the primary location of the CMO staff officer (G5/S5). This cell also directs the manning and operation of the CMO cell (Rear) and the Civil-Military Operations Center (CMOC).

The CMO cell (Rear) is located at the rear CP or at the COSCOM/DISCOM or like unit. Its focus is on logistical support to include foreign nation support (FNS), relief supplies, Humanitarian Assistance (HA), and support to Dislocated Civilian (DC) operations.

The CMOC is a very important cell. The CMOC serves as the link between the military commander and the local government, the local populace, and any NGOs, PVOs, and IOs in the area of operations. This allows the commander to provide a unity of effort within the area of operations and may significantly reduce the impact civilian requirements on the resources of the military commander.

Therefore, the future military force structure must include a robust CMO staff section in all units from the battalion level through the warfighting CINC level. It is certain that the civilian dimension will continue to impact on military operations.

Another area which requires significant changes to successfully meet the needs of military commanders in the 21st century is Civil Affairs. The Civil Affairs force structure in place today does not adequately meet the needs of today's Army, much less into the next century. The current CA force structure was designed along the mold from WWII. Its emphasis on functional specialties reflects the mission after WWII of rebuilding nations and serving as an occupying power. These situations are not likely missions for today's Army. The possibility still exists, although remotely; therefore, CA

force structure should retain a small functional specialty capability. In the aftermath of WWII, there were no major civilian organizations available to deal with nation building, however, today there are many organizations designed for that express purpose. These include the UN, USAID, UNDP and a plethora of other NGOs, PVOs, and IOs. In the event that the US does get involved in a major nation building effort, the Department of State will most likely have the lead and USAID will be the execution agent. There is a need for a CA functional specialty presence to act as a liaison between these agencies and the US military. However, it is not likely, that the CA force will be the execution agent for the mission.

Due to the significant impact of the civilian dimension on military operations, it is imperative that CA force structure be designed to support the military commander in the accomplishment of his mission. This calls for a force structure that has enough CA Direct Support Teams (CADST) to support the maneuver battalions; enough CA Operational Planning Teams (CAOPT)to support brigade, division, corps, and JTF staffs, and sufficient CINC Support Teams (CA Plans, Programs, & Policy Teams) (CAP3)to support the CINC staffs. Under current force structure, the bulk of the force is tied up in functional specialty teams. There is not a sufficient number of CADSTs, CAOPTs, and CAP3 teams to adequately support the commanders in the field. The functional specialty teams are most often task organized into other teams to meet the needs of commanders. This method does not provide the best support to the commander. CA teams must train together and be prepared to perform their mission. The old army adage "train as you will fight" seems to be ignored in the current CA force structure.

CA force structure for the 21st century should include one brigade to which one complete set of functional specialist teams are assigned. This brigade would come under the direct direction of USACAPOC and teams of functional specialists would be deployed based on a validated need. There would be no need for this unit to maintain regional alignment because their primary concern is the functional specialties. The remainder of the force would be restructured to provide regionally oriented CA commands, brigades, battalions, detachments and teams to adequately fill the need for CAP3 teams, CAOPTs, and CADSTs to support the commanders in the field. This restructuring would allow CA forces to "train as they will fight" and provide the maneuver commanders with the support they require. The requirement to maintain the AC CA battalion would remain in order to provide the rapid response and deployment capability.

There is no doubt that CMO and CA will continue to play a major role in future military operations. However, these elements must be redesigned to meet the needs of the commander in an area of operations. The emphasis for CA must shift from a force designed to rebuild nations to a force designed to support the military commander in the accomplishment of his mission.

In conclusion, the main focus of this vision of CMO and CA for the future is one of a force designed for the express purpose of supporting the maneuver commander at all levels with adequate CMO staff sections built into unit TOEs and a CA structure designed to support the commander. This vision also requires that CMO staff officers be on par with the other principal staff officers for operations, intelligence, personnel, and logistics. This vision demands that CMO be addressed in all phases of the planning

process. Commanders must remember that CMO is a function of command. It is the commander's responsibility and he ensures it is adequately accomplished by delegating this function to the CMO staff officer. It is the responsibility of the senior Army and DoD leadership to ensure commanders have the tools required to accomplish the mission--adequate CMO staff sections and a functionally sound CA force.

The Future Of Simulations And Exercises For Special Operations Forces

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Introduction

In the future Special Operations Forces (SOF) will continue to be called upon to respond to various types of missions beyond traditional conflict. The increase in the number of operations requiring humanitarian assistance, such as *Provide Comfort, Restore Hope, Uphold Democracy,* and *Joint Endeavor* points toward new requirements for the training of SOF. Another area of emerging missions for SOF is in Operations Other Than War (OOTW). Both of these emerging mission areas must be addressed, while at the same time maintaining and enhancing the training requirements for these forces as warfighters in a changing world. The future role of SOF as an offensive instrument in conventional as well as OOTW operations and as a tool in humanitarian missions must be decided.

How SOF will participate in simulations and exercises will not only be determined by the types of missions they will be called on to perform, but also by the allocation of funds made difficult by budget constraints. The constant presence of budgetary restraints and the necessary prioritization of budget areas create a challenge to the planning and implementation of exercises and simulations. Over the years, simulations and exercise participation have been given a low priority during budgetary allocation. If this trend continues, and the cost of actual mission participation, equipment, development, and procurement continues to rise, SOF are in danger of having training deficiencies when functioning at the combined or joint levels. All too often, current simulations and exercises take a SOF task force up to and through the deployment phase with little consideration given to their actions after this initial phase other than PSYOPS.

To be able to train for the variety of future missions with a constant eye on budgetary concerns, SOF need to prepare globally while training locally. By creating and networking simulation facilities at localized SOF sites, the units at group or team levels will be able to participate at combined and joint level exercises and simulations anywhere in the world. A new set of training initiatives fully covering future SOF missions, including conflict, OOTW, and humanitarian efforts needs, to be developed and standardized across the forces. This standardization will allow units to train separately if necessary, yet function uniformly on operations. This paper will discuss a set of training tools that can be developed to support these initiatives and be kept on site with the SOF units.

Background

Traditionally, SOF have integrated their forces into the theater CINCs' Chairman, Joint Chiefs of Staff (CJCS) exercises, rather than create exercises of their own. Since FY 94, USSOCOM forces have participated in approximately 60 to 70 CJCS exercises per year. Most of these exercises are joint in nature, combining conventional forces with special operations forces. Those exercises which are not joint are usually in a coalition setting, as are many of the joint exercises. The number of joint and coalition exercises vary by theater. For example, in ACOM's area of responsibility (AOR), all the exercises in which SOCOM participates are joint and a few are multinational. In CENTCOM's AOR, most of the exercises are multinational, but only a few are joint.

SOCOM also conducts coalition training through Joint/Combined Exchange Training (JCET) events. The JCET program evolved from the 1992 Congressional codification of 10 U.S.C., Statute 2011, the SOF exception to the Foreign Assistance Act. JCET events allow SOF to train to unit mission essential tasks in theater, thus building on their unique language and cultural proficiency requirements. SOF participation levels in most JCETs consist of less than 30 personnel, even though some reach upwards of 100. SOF must comply with any State Department country restrictions, such as humanitarian training only, no sniper training, etc.

Modeling and simulations (M&S) play a key role in the CJCS exercise program, but M&S do not affect JCETs. SOCOM has not developed any unique models or simulations to support its participation in CJCS exercises. Deficiencies have been identified in the Services' models in regard to SOF's level of fidelity, and SOCOM is not only working to ensure that the Services improve the SOF fidelity, but also to ensure that the models can interact with each other as SOF would in the real world. To that end, the following training tool is proposed.

The Concept

The basic component of a new local/global training tool and system will be a desktop computing compact disk that can be used on any personal computer meeting industry standards for commercial multimedia. The system and tools will be easily accessible to a localized SOF team or a Joint level exercise. The first part of the system will include tools for the retrieval, exchange, and distribution of information. Since the future use of SOF extends beyond their use and support in armed conflicts, information on OOTW and humanitarian missions must be adequately presented to service members in a timely and efficient manner. The second part of the system would include a fundamentally new computer assisted simulation. This simulation must not only fully represent the capabilities and missions essential to SOF beyond kinetic warfare, but it must also be playable at individual team levels as well as fully distributed and integrated into Joint level exercises.

The Tool

A compact disk will be distributed to the lowest level necessary at which a unit might function independently for any period of time during a mission (in most cases this will be team or platoon level), as well as to the parent unit J3. The compact disk's first part will be an information exchange area. While working independently at their computers, service members will be able to browse and search a resident multimedia database which will include sections on the history and background of traditional conflict, OOTW, and humanitarian missions relevant to SOF, a technology area which will contain descriptions of current equipment and systems, and an area for documents such as service and joint publications.

The second part of the compact disk will be an Internet access area that will link all three of the previous areas to the Internet and Usenet. A host World Wide Web site can be developed and maintained by a sponsor to handle the specific needs for this tool, or links to relevant sites and search engines can be utilized. With access to the Internet established, the compact disk becomes a viable tool for the user across all areas of the disk. The technology section can be updated to include new systems and equipment as they become available, updates to publications can be accessed in the documents section, current news and articles can be read, and research can be conducted and disseminated to relevant groups and users.

The interactive elemental of the compact disk will be a comprehensive simulation that not only includes a kinetic warfare backbone, but also gives the service members using the simulation the opportunity to choose actions and events that are germane to OOTW and humanitarian missions. These actions and events (conducting police actions, delivering medical aid, providing potable water, constructing shelters, providing translators, etc.) can affect the course of a simulation as much as the current tasks of force-on-force actions and PSYOPS. With this in mind, it is imperative that any future simulations or models are robust enough to handle as many of the mission types as possible. The last component of the disk will be the ability to connect the events being generated by the smallest unit using the simulation into a fully integrated and distributed exercise all the way up to the joint level.

The System

The tool only becomes a system once it is fully integrated with other users, local or remote, and across varied echelons. To accomplish this last task it would be helpful if some peripheral technologies were adapted across the services, but most definitely joint. The initial technology must be the adaptation of an agreed upon visual medium. All users in the system need to see and work in an identical environment in order for integration to occur seamlessly. This can be as easy as using an agreed upon digitized map from the Defense Mapping Agency (DMA), or as robust as creating an entirely new

Graphic User Interface (GUI) for the Joint Modeling and Simulation System. Once the environment is established, the data links can take place across the Global Command and Control System (GCCS) as the standard mode of transfer.

An example of the system can be described as follows: A joint level exercise is taking place at the headquarters of the area command. The CINC's staff has a number of mission requirements that it would like to see exercised, and the simulation is planned accordingly in order to stress the staff. During the exercise, events are initiated and responded to via GCCS, which includes units as low as team level. When this is the case, users at the SOF team level would conduct the task at their level and the results would be related up to the joint exercise without regard for location of the participants. With this example all units at all levels can be played without them having to be in a central location. The expense of running an integrated simulation with this new system is reduced through less transportation and minimum setup costs. Yet the value added to training is expanded. Even when joint exercises and simulations are not taking place, a user will be able to train to the same integrity and at varied levels because the tool is standardized.

As new and varied challenges arise, our SOF must be ready and able to meet them. Given the increase in mission responsibility and budgetary constraints, a new way of responding to these challenges must be developed and implemented. This type of system, a new way of thinking about training and mission preparedness, must be developed in order to meet the challenges of future missions. Whether it is for traditional conflict, OOTW, or humanitarian missions, this system allows for the maxim *prepare globally while training locally*.

SOF VISION 2020

David W. MacNeil
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Directorate of Plans, Policy, and Strategic Assessments, Policy and Strategy Division
MacDill AFB, Florida
3 January 1997

INTRODUCTION

SOF Vision 2020 is the United States Special Operations Command's (USSOCOM) framework for building and maintaining the necessary operational capabilities of future special operations forces (SOF). This vision incorporates our two most fundamental strengths—quality people with unequaled skills and a broad-based technological edge—to ensure tomorrow's SOF are structured, trained and equipped to counter diverse threats to our national security. We will provide military capabilities not available elsewhere in the armed forces.

CINC'S VISION

"Tomorrow's Special Operations Forces—building on today's successes with:

- *Quality people who are experienced, self-reliant warrior-diplomats*
- *Versatile and responsive units that are regionally and culturally oriented*
- *Specialized state-of-the-art equipment*

Operating in a volatile and uncertain world while providing unique capabilities across the continuum of conflict."

THE GLOBAL ENVIRONMENT

The complexion of the future global strategic environment will be characterized by a broad range of traditional and non-traditional actors. Although they may not pose a strategic threat to the U.S., many can seriously threaten U.S. interests in a limited time and place. The increasing reliance upon information systems will provide tempting avenues of attack for insurgents, terrorists, and other potential adversaries. Changing regional trends will also create a wide range of threats. Non-state actors with access to technology will emerge, giving them advantage over other regional actors. Advances in technology will enable new forms of warfare.

ADVANCING AMERICA'S NATIONAL INTEREST

America contributes to world security and stability by countering the drug threat, combating terrorism and countering the proliferation of weapons of mass destruction. Sustained high readiness levels and prolonged engagement in nearly all areas of the world

place SOF in an ideal position to detect trouble as it develops and to deter or prevent conflict. SOF can work either unilaterally or as part of a joint team to lay the ground work for conventional forces.

BUILDING TOWARD DOD'S FUTURE

The Chairman's JV 2010 is the conceptual template of how America's armed forces will channel the vitality and innovation of our people and leverage technology opportunities to achieve new levels of effectiveness in joint warfighting. The crux of JV 2010 is its four operational concepts of dominant maneuver, precision engagement, full-dimensional protection, and focused logistics — all of which are enabled by information superiority. These concepts are tied to conventional forces as well as how SOF support conventional forces.

BUILDING TOWARD THE SOF FUTURE

SOF Vision 2020 captures the concepts of JV 2010 and carries them forward to integrate SOF activities and capabilities with the Services and their larger conventional forces. Furthermore, SOF Vision 2020 indicates where we must sustain or develop capabilities to compliment those of the Services and other agencies. A faster, and better educated force must be provided to enhance conventional capabilities.

DEFINING CHARACTERISTICS

Examination of the strategic landscape, possible threats, technological trends and future roles and missions identifies SOF's defining characteristics:

- Sized/trained/equipped to engage across the technological and operational continuums
- Regionally focused: culturally/linguistically/politically
- Rapidly deployable/surgical strike capable/able to achieve combat, mobility, and information dominance on a limited scale
- Flexible/agile joint forces which can develop and execute unconventional, audacious, high pay-off courses of action

In addition to military competence and regional knowledge, an appreciation of historical, political, cultural, and socio-economic realities will be more essential in 2020 as the U.S. reduces its permanent military and diplomatic presence in parts of the world.

INSTRUMENTS OF SUCCESS

To prepare SOF properly and ensure relevancy to future threats, SOF Vision 2020 outlines three parallel paths—professional development, technological innovation, and proactive acquisition. The heritage, professionalism, and common goals shared by SOF today provide the catalyst for SOF Vision 2020. People are the key to our future success. We must maintain our traditional emphasis on high-quality, rigorous training and reinforce

it with effective education that encourages creative, thoughtful solutions to sensitive and high-risk situations. We will look to emerging, leading-edge technologies in such areas as mobility, sensing and identification, miniaturization, secure communications, advanced munitions, stealth, human enhancements, and robotics to increase the efficiency and effectiveness of our people and platforms. Our future acquisition process will acquire systems which will provide the best capability for effecting SOF missions based on performance and lifecycle cost. This concept implies that we select a balance of systems based on SOF requirements. An overarching challenge for the future is a responsive logistics system that is affordable, sustainable, and fully interoperable with the Services.

IMPLEMENTATION

SOF Vision 2020 is the umbrella under which all other activities must align. Our four core processes of strategic planning, resourcing, acquisition, and operations and training must be integrated through the broad concepts addressed in SOF Vision 2020. As the Strategic Planning Process considers SOF needs beyond the early years of the millennium, SOF Vision 2020 will provide the guidance for future strategies.

CONCLUSION

The characteristics of future SOF will build upon its strengths of today—highly motivated and trained people, employing state-of-the-art technology, operating as a joint and cohesive force to provide unique and bold courses of action to the NCA. The demand for SOF will continue to grow. In the year 2020, we will continue to be the world's premier special operations forces —already there or first to deploy — in a volatile and uncertain world.

FORCE PROTECTION

****

Rod Lenahan & Frank Mazzone
16 January 1997

Introduction:

Logistics, training, tactics, Command and Control, and strategy have been recognized throughout military history as essential factors in the overall force readiness equation. All of these elements assume a prominent role in the sustainment and success of a force. However, there are two other elements, *intelligence* and *security,* which are quickly labeled with the word "failure" when success is not attained or the adversary attacks unexpectedly.

Purpose:

The purpose of this presentation is to examine both of these areas, intelligence and security, and to discuss an element of each which has either been shrouded in mystery and misperception, or largely ignored. The paper offers some suggestions to improve our ability in both areas, one by training and education, and the other by replacing a generally static defensive philosophy with dynamic mentality that takes advantage of our lead in surveillance and intrusion detection technologies. The ultimate goal is to save American lives.

Problem Discussion: Point One -Intelligence

Human Intelligence: In the case of intelligence, the aspect of concern is *HUMINT* - that is information provided by human beings. In security, the aspect is threat awareness. These two areas, intelligence and security, have always been intertwined. However, a clear understanding of their vulnerabilities has sometimes been lacking. This is not to say that they have not occasionally come together in the mind of some commanders, but often this juncture has been a matter of happenstance rather than deliberate meditation or planning.

Blame: In the aftermath of a surprise assault, be it as large as the Viet Cong "national uprising" of Tet 1968, or as focused as the truck bombings of the US Marine barracks and French peacekeeper compound in Lebanon, on 23 October 1983, or the more recent bomb assault on the Khobar Towers in Saudi Arabia last June (1996) a portion of the

blame is typically laid to "poor intelligence" or "poor security", or a cry goes out to lay the blame on the Chain of Command for failing to take all the preventative measures possible.

Communication: Once past the initial scramble to assign blame, the failure is often found to be one of communication or misunderstanding. Often the warning message is not considered clear enough to warrant concrete action and given limited security resources, very little substantive change in the security posture occurs.

Warning & Preparation: In the case of the Vietnamese offensive "warnings and indications" had been piling up during the previous 90 days; however, a specific time frame was not known until approximately 48 hours prior to the event. Beginning at noon the day before the offensive began, a series of special warning messages made their way down the chain of command to the service components and the field forces. Reaction to the warning ranged from next to nothing to taking positive measures such as doubling and tripling the guard posture, establishing additional security outposts and bringing reaction forces to a higher state of readiness. In these latter cases (and there were many), where such positive measures were taken, individual unit level enemy attacks were blunted at great cost to the attackers. Many other enemy soldiers were trapped after their initial success and suffered extensive losses; however, no American authority anticipated the full country wide nature of the enemy's offensive action. Individual U.S., Allied and South Vietnamese units, billets, bases and compounds survived and responded in accordance with their own acceptance of the warning and the local security actions they undertook .

Reliable Humint: The challenge of creating a reliable *Humint* reporting structure that can be employed on a short notice anywhere in the world, and be productive in the sense of penetrating the structure of unknown adversaries is essentially impossible. To be effective, that is to provide productive reporting, the target group must be identified and known well in advance, and a relationship and confidence developed by the "source" that gains the source access to the inner planning circle. This scenario typically requires unique personnel and years of patient work to achieve. Aside from long term adversarial equations such as the former East-West Cold War, the 46 year Korean stale-mate, the near 50 year Cuban-American stand-off, and the Vietnam conflict, this type of placement is essentially impossible to acquire.

Source Categories: However, before proceeding further it is worth while to briefly describe several categories of *Humint* sources. For the purposes of this overview I have divided *Humint* sources into four general categories. One is the well developed mole or the in-place source that has been reporting reliably for an extended period of time. As alluded to previously, this type of source is difficult to find or create. Another is an observer, who is neutral or opposed to the adversary, and does not have any particular access to the inner circles of the adversary but occasionally witnesses an event and passes the information to an American or allied official who in turn passes it to American or Allied

intelligence. This type of source is sometimes referred to as a one-time-source or low level source. This reporting although fragmentary and incomplete often is correct within its own context and warrants a verification effort, and in a broad sense could be called defensive *Humint*. The third category is often a diplomatic or media source who have no more direct access than the one-time-source but because of their position and background are prone to provide opinions and hearsay as facts or assessments often building what is commonly referred to as "conventional" wisdom.

Lethal Category: The fourth and the most lethal type of source is the "paid to report walk-in". It is not unusual for this type of person to have or claim to have some third tier access or at least freedom of general movement in the area of interest. It is also not unusual for this person be either a fabricator - a con artist- who makes up reports by combining street rumors, speculation, hearsay and opinions, and creating an intriguing story line with multiple facets of pseudo-detail, which are believable, but cannot be verified. The impact of this type of reporting can range from the unproductive and wasteful use of time and money at the low end of the spectrum to extremely lethal at the other end, potentially leading a force into a trap.

Inherent Vulnerability: It is easy for a *HUMINT* structure created overnight to meet an unexpected contingency, to become a victim of the last two categories as well as street rumor, diplomatic speculation, circular reporting, and purposeful deception by the adversary. As the initiator of the crisis, the adversary has a strategic game plan and several tactical options already worked out, including the use of offensive *Humint*. Typically the adversary has gamed the scenario to include the likely actions and reactions of U.S. and its allies based upon the prevailing political rules of the road, which in most cases are well publicized. The other tools the adversary has at his command are the choice of the time, location and nature of the attack. This is not a new revelation.

Options & Initiatives: The initiator of any military, criminal or terrorist action has always had these options. However, our force vulnerability has increased due to the nature of the undeclared and often very complicated political-civil-ideological conflict our forces have come to be involved in. The enemy is no longer another uniformed soldier operating as part of recognizable military forces with both tactical and strategic goals and a certain set of rules. Today's adversary is far more likely to be a civilian, man or woman or cleric, without regard for their own life and willing to sacrifice their earthly existence for a "greater cause".

Persistent Threat: A fundamental fact of the next decade (as it has been for the last two) is that there will always be a threat to U.S. personnel from an almost inexhaustible cadre of terrorists, zealots and martyrs. It will take an integrated security shield, perpetual vigilance and a more integrated use of available intelligence, and better trained personnel at

lower echelons relying more on the proven and verifiable than falling into the pitfalls of the *HUMINT* "rent-a-spy" approach to reduce the threat.

Inside Information: One of the foibles foisted on the "operations" community by the world of spy fiction and conventional wisdom is the hope of receiving the eleventh hour message from Garcia that lays out, with precision and completeness, the immediate plans of the enemy. In prolonged major conflicts between combat forces that communicate via a prescribed structure, and must mass a quantity of forces, and logistics, and command and control assets before engaging in combat, this is still achievable due to our use of technical intelligence (such as communications, signal interception, and strategic and tactical imagery, and integrated analysis). However, in the quick reaction never-never contingency world of today where the commander (and his often junior intelligence officer) is forced to rely on the vagaries of a just born and unproven *Humint* apparatus to formulate plans, the recipe for mission failure and force destruction is readily available.

Humint Believability: Even in cases where much of the intelligence searchlight has been brought to bear on a subject, *HUMINT* because it tells a "story" and theoretically comes from multiple sources, is more likely to be believed than the painstaking results of analysis of the more reliable technical means. This is particularly likely when technical coverage is limited as is the case in the early stages of most contingencies. It is compounded when the enemy command and control structure consists of a small inner circle which frequently use ethnicity, blood rites or religious ties to insulate and protect themselves, and their communications structure consists of couriers and a myriad of landline telephones or a flexible network making innovative use of some of the tools of modern communication..

Foibles of Humint: Two classic examples of the foibles of *Humint* come to mind. The most telling was the record of *Humint* during the 444 days of the Iran hostage situation and the five days of Operation Just Cause when U.S. Special Operations Teams "hit" more than a dozen "dry holes" most of which were identified by some sort of *HUMINT*. Any one of these "dry holes" could have been an ambush, causing unnecessary American losses. Fortunately this was not the case as none of the multiple telephone responses to the bounty placed on General Noriega had destruction of American forces as their goal. However, back to the classic case of *Humint* and the U.S. efforts to locate and recover the Americans held hostage in Iran.

Source Claims: The examples of the fragility of relying on unproven *Humint* abounded particularly in the last five months of the crisis. Beginning in September 1980, two months after the bulk of the hostages had been returned to Tehran, after being scattered around the country in the wake of the rescue mission launched the previous April, *HUMINT* started to report that most of the hostages were back in the Embassy compound. One source claimed to have seen 21 of the hostages and talked to two. This "compound" report

was initially contradicted by other highly reliable means. However over the months of October and November other "Rent-a-Spy" *Humint* sources reported similar information and several foreign diplomatic sources passed on their corresponding speculation.

Manipulation of Humint: To continue, in December, the nature of the reporting changed with more than a half dozen hotels being reported as the hostage holding sites forcing the abandonment of any serious rescue efforts. The real facts of the situation came to light in late January 1981 when the hostages were released and debriefed. The debriefing confirmed that none of the dispersed hostages were returned to the Embassy compound as reported by "eye-witness-rent-a-spy *HUMINT*", but were held in a downtown prison as suspected by the JTF in August. If the U.S. had launched a second rescue attempt during this time frame (accepting the *HUMINT* reporting as the basis for its actions), the rescue force would definitely have gone into a "dry hole" and conceivably a very well laid trap. The debriefing also confirmed the hostages were not being held in any of the hotels or other locations reported during their last three weeks of captivity. In no case did the "Rent-a-Spy *HUMINT* available ever report the correct hostage locations. However, it and the abundant flood of street rumors, and media and diplomatic speculation certainly did spew forth a flood of false information. Subsequent debriefing of some of these "paid" sources confirmed they were professional liars and fully capable of defeating a polygraph test.

Buyer Beware: To paraphrase something you have all heard in some public service announcements "If it sounds too good to be true, it probably is not true." Or put another way, the more complete a story a foreign *Humint* source presents, particularly if it contains "reasons, rationale and motives", the more likely it is to be false. If none of its ingredients can be confirmed by some other means (other than another "unproven" *Humint* source or speculative media or diplomatic reporting) the higher the probability it is fabricated. experience and training are the only way to develop a "knack" for sorting out fact from fiction.

Training Concern: Before moving on to the security segment of the presentation (and at the risk of starting a debate), we am concerned that many of our young hard charging technically and tactically oriented intelligence officers, regardless of service, have not yet had the opportunity to acquire either, and our command and operations personnel are no better off in sorting out the wheat from the chaff. We perceive this as being a crucial need in all our forces, but particularly those within the Special Operations and Joint Task Force community who are the most likely to be put in harms way. Applying an organizational solution such as charging a disciple divided rear-area theater intelligence staff or higher *Humint* organization with the responsibility to assess *Humint* reporting is not the correct answer.

Problem Discussion: Point Two - Defensive Security

Achilles Heels: Now turning to other key element of force protection - security, and focusing on the "warning and indications" relationship of intelligence and security, particularly as they impact the defense of our contingency or peacekeeping deployed forces. The earlier examples of "warning -i.e. defensive intelligence" that were largely ignored came from low level, often one-time-sources, mostly Vietnamese villagers and Lebanese citizens with no ax to grind. *This our first Achilles Heel.* These types of reports should always be taken seriously, particularly when the volume and persistency continues. *Our second is a function of culture.* The timeline of the adversary is rarely as rapid as Americans and most Europeans are accustomed to. It is usually much slower by a factor of 3 or 4 to one. We Americans peak early then, after 3 hours, 3 days or 3 weeks, we drop our guard and revert to a lower, i.e. routine pattern of security. The non-military, i.e. political adversary, will stalk the "herd" and select one, two, or three victims who are deemed "good" impact targets and then monitor them for vulnerabilities. The final selection process is made after careful and repeated observation of the activity and security patterns of the potential targets. The adversary's final choice is often made based on a trade-off decision between the target's vulnerabilities and its psychological and media impact. *It is the observed vulnerabilities and security precautions that are our third Achilles heel.*

Fundamentally any security measure that can be observed by an adversary can be sidestepped, penetrated or overcome by deception or force, and any persistent vulnerability can be exploited to the benefit of the adversary.

Security Philosophy: In the vernacular of the physical protection analyst of 20 years ago, security was defined by three words - deter, detect and alarm. This perspective assumed a criminal penetration oriented adversary, a material target and a ready reaction force. *In today's age of more sophisticated and dedicated attackers, additional terms must be added to the physical security equation - Deter, Detect, **Delay, Deny and Document.***

Deter is the fence or demarcation line. ***Detect*** is the recognition and tracking of a potential threat before and after it crosses the demarcation line. ***Delay*** is the activation of additional here-to-fore unobserved defenses, or an extendible zone of detection whenever "defensive warnings" are received. ***Deny*** is the destruction, isolation or entrapment of the attacker before the target zone can be reached.

PREMISE:

If we are to minimize or reverse the trend of the American flag and American troops being a magnet for the terrorist attack, be it a car or truck bomb or a stand-off rocket attack by a set of 122mm rocket launchers as used in Vietnam, *we must extend our warning and interception screen* and catch these attackers with traps and surprises of our own.

CALL TO ACTION:

Action Steps:

If we accept the above premise as one of many actions to be undertaken at all levels to enhance Force Protection it will require two fundamental actions. *First*, a better and more educated use of intelligence at the point where the rubber meets the road, and *second*, the adoption of active defensive measures designed to preempt the penetrator in the act.

Scope of Efforts:

Intelligence: The first will require training, understanding and education. A key ingredient toward this goal would be short course of case studies in a workshop environment similar to the very productive Joint Special Operations Planning Workshops conducted by the Special Operations School at Hurlburt. This type of vehicle could be in place within three to four months after approval.

Security: The second will require a slightly longer time frame but could reap results in as little as six months from approval. This relatively short term effort would involve both technology and training. The training should be a joint venture building on an existing joint service security training program such as that conducted at Lackland Air Force Base. The technology challenge is one of focus and cooperation. Intrusion detection and surveillance technology is here, and more can be fielded quickly and economically by integrating several independent technologies. The effort should be hands-on development, testing, training and fielding approach - - not a paper oriented study program.

Technology Integration: By integrating existing and emerging detection and surveillance technologies into a deployable, relocatable and reconfigurable system the typical static defense shield we have deployed in the past can become the eyes of the cat and the jaws of the tiger. The effective employment of these technologies in layered, interlocking and self validating zones can immensely extend the surveillance and warning perimeter and multiply the effectiveness of the guard force five fold, while extending their ability to "reach out and touch" the attacker long before he gets close to his killing zone.

Intruder/Event Documentation: However, a new and key component of any new detection and tracking system that we deploy must have the capability to accomplish the last and fifth security "D" - DOCUMENT. It is becoming more and more critical as perpetrators become more daring. The chance of stopping all attacks declines with our unwillingness to fully implement the other four "Ds", while at the same time saddling our sentries with empty magazines and extremely tight rules of engagement. This is particularly true in the pseudo-safe world of peacekeeping and humanitarian operations where political-humanitarian and civilian sensitivities regarding host nation foreign

nationals take precedent over the safety of American lives. What this means is that a need exists not only to extend and layer our security screen and act on warning intelligence, but to document (photograph and sound record) the actions and movements, and where ever possible the identity of the attacker(s) and any suspected accomplices before, during and after the assault.

Documentation Dividends: In those cases where an attack is conducted and the attackers escape or are captured in the act, this documentation will greatly assist in finding and persecuting them under whatever law prevails. An additional benefit to pursuing an active reach-out-and-touch someone security policy of this type will be its deterrent impact. Right now the probability of an attacker being caught is exceedingly low and as long as American forces can be attacked with impunity, attacks will continue.

SUMMATION:

In closing, we recognize that the scenarios described in this presentation are snapshots of history and any solution we implement will have to be dynamic and periodically reviewed, enhanced and revised to counter the enemy's next change in tactics, and take advantage of advances in surveillance and detection technology. This will be a continual battle of wits and dynamics since the adversary's strategic objective will not change, i.e. the demise of American influence, the punishment and humiliation of American administrations and the taking of American lives.

Although ultimately it is the Commander's responsibility for the security of the force, this responsibility must be shared beforehand by the intelligence officer who is responsible to provide warning, and the security officer who is responsible to maintain vigilance, and the operations officer who has the responsibility to insure these two teammates have the tools and mechanism to do their jobs. When a warning is received it should be evaluated and used as a catalyst to: 1) alert and extend the visible security screen; 2) reinforce and reposition the unseen elements; and 3) increase the reaction capability of the force. All of these measures are designed to stop an attacker before they close with the target. To borrow a lesson from our revolutionary and civil war predecessors, the operative command when a defensive warning is received is to order "Scouts and Pickets Out!".

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BIOTERROR: THE THREAT & THE RESPONSE

Since World War I, Germ Warfare on the battlefield has long been a national security issue. The threatened or actual Iraqi use of biochemical weapons against U.S. troops in Desert Storm reinforced this concern. That chemical and biological warfare remains a problem for the military is a given. But today the far greater threat is not biochemical warfare on the battlefield but the criminal or terrorist use of these weapons of mass destruction against the civilian population of the United States.

This truth certainly came "on screen" for national security experts when the Japanese cult, Aum Shinrikyo planted botulism and sarin on the Tokyo subway system in March of last year. The botulism-sarin releases also put our Federal, State and local emergency management professionals on notice that if an American city were hit, they would be ill-prepared to cope with the consequent medical and public safety catastrophe.

Aum also gave the counter-terrorist establishment, traditionally used to single-issue, politically motivated demands, a new perspective on the psyche of international terrorism. It used to be that terrorists organized in tightly-knit, disciplined groups, had specific goals and operated with some kind of self-imposed constraints. Now, with the new millennium comes a new breed of terrorist, an amalgam of extremist cults, sectarians and religious fundamentalists. These are fanatics who do not think in terms of some attainable goal like land or the release of political prisoners. These zealots want nothing less than the total destruction of Western Civilization. They view the West as morally and culturally corrupting, and what makes these "millennians" even more threatening is the access they have to modern technology coupled with a willingness to use scientific expertise to create and use biochemical weapons of mass destruction.

How <u>Real</u> is the Bioterror Threat?

In Washington, the Federal Emergency Management Agency has a motto: *Not If But When.* So it is with bioterror. Sooner, rather than later, in America, psychotics, whether criminal or terrorist, will produce and deliver a germ weapon strike against the civilian population of the United States. Almost assuredly the attack will happen in an urban setting. Targeted will be an air-terminal or a transport hub, a sports arena or federal building, perhaps a financially inspired target such as the Stock Exchange in New York, the Federal Reserve in Boston or the Sears Tower in Chicago. Whatever the target, when the release comes, unsuspecting Americans will breathe toxic air and a city or a region of the country will experience a nightmare epidemic unlike anything visited on an urban population since bubonic plague ravaged London in 1665. [Prior to that, the "Black Death" decimated Europe in the 14th Century and since the terrible outbreak of "Spanish" flu spread from Europe to America in 1918 resulting in 20 million dead.] Tomorrow it will not be an act of god or nature, but a designed and delivered biobomb from foreign or domestic fanatics.

Around the world, especially in Asia and Middle East, the deadliest agents of biological origin [ABOs] are for sale to an ever-widening terrorist clientele. The supermarket for this technology has been and continues to be the laboratories of a secret Russian B/W program controlled by the Russian Ministry of Defense, code-named *Biopreperat.* Despite Boris Yelstin's assurances to President Clinton at their last summit meeting that "everything has stopped" and that "you should not worry," *Biopreperat* continues.

A defector from *Biopreperat,* sixty-year-old, molecular biologist Vladamir Pasechnik, presently living in England, reports that the scale of *Biopreperat's* operation is vast. The program employs 15,000 people at five manufacturing plants funded by a secret budget of 200 million rubles. Pasechnik's assessment: "Yelstin may believe what he told the President but that is not what's actually happening. The military are really able to defy him in this way. It tells a lot about Russia".

The U.S. Arms Control and Disarmament Agency in its annual report to Congress released August 7, 1996 also confirms that a resurgent and renamed *Biopreperat* secretly continues to develop ***offensive*** biological weapons in defiance of the 1972 Biological Weapons Convention.

More worrisome to counter-proliferation experts are the disgruntled military officers and poorly paid scientists with ties to the Russian Mafia who are stealing and dealing biowarfare technology from *Biopreperat's* laboratories. Eager buyers around the world, specifically Syria, Iran, Libya, The Sudan and North Korea acquire this technology then quietly pass it along to terrorist networks operating in Western Europe, Asia and the United States. The end result: American cities may well experience nightmare scenarios counter-terrorists have quietly talked about for years.

As with any terrorist threat, mitigating a bioterror attack is primarily one of good intelligence. However, even with the vast funding, resources and expertise at their disposal, the FBI, DIA, CIA and other intelligence agencies will, in the end, be unable to prevent the criminal or terrorist use of biological weapons in the United States. This pessimistic view, with the horrific scenes of sick and dying Americans on the nation's TV screens, is based on a fundamental fact that a germ weapon--compared to radiological and chemicals--is inexpensive and easy to procure, relatively easy to produce, and extremely simple to vector and deliver.

What is biological terrorism?

Bioterrorism is the planned release of micro-organisms or toxins to kill or cause disease to an unsuspecting civilian population. ABOs fall into one of three categories: bacteria, viruses or toxins.

- Bacteria [anthrax, plague, tularemia] have a long history as germ weapons. If diagnosed at an early stage they can be treated with antibiotics such as penicillin and ciprofloxacin.
- Viruses [smallpox, flu, marburg, ebola] are much smaller organisms with a genetic core (DNA or RNA) encased by a protective protein which facilitates cell infection. Viruses require a receptive host in order to thrive and are far more difficult to treat than either toxins or bacteria.
- Toxins [botulism, ricin] are poisons either made synthetically or by living organisms. Toxins are non-living organisms and therefore incapable of replication. They do not have a multiplier effect as some bacteria and most viruses do.

Unlike radiological or explosive devices, ABOs are not revealed by metal detectors, trained dogs or traditional anti-terrorist scanning equipment. They can be transported in minuscule containers, with a tiny amount–no more than a gram–capable of doing great harm. They can also be designed with an elastic time-lag between the release of the agent and its lethal effect upon its victims, thus providing the perpetrator a greater chance of avoiding detection.

Anonymity is the most salient characteristic of ABOs. Unlike chemicals, biologicals cannot be seen, felt, smelled or tasted. We would know when a chemical attack occurs. Eyes water. Skin burns. But with a biologic weapon, an agent on the order of 1-5 microns will be inhaled without any physical sensation. And unlike chemicals, many biologics have a multiplier effect, *the contagion factor,* which makes them even more devastating. An infected victim instantly becomes a walking weapon.

With technical expertise in bioengineering and a minimum of $10,000 off-the shelf equipment [glove-box, HEPA mask, centrifuges, cultivators, vacuum dryer, LN2 storage tanks] a graduate student can produce a bacterial, viral or toxic pathogen. To culture ricin, anthrax, botulism, plague or marburg is no more difficult than brewing beer. These organisms can then be freeze-dried, set to time-release, encapsulated and be as portable as Alka-Seltzer tablets

A threat assessment done by a national security team for a possible attack on the World Trade Center in New York calculated that one kilogram of dried botulism introduced into the building's air-conditioning system would circulate throughout the building's 10 billion liters of air-space within 1.2 hours and cause a minimum of 20,000 casualties.

Another study sponsored by the Department of Defense estimated that 50 kg of anthrax, sprayed in a 2 km line over metropolitan New York would incapacitate 700,000 and leave 400,000 dead.

Last summer, the Naval War College sponsored its annual wargame, "Global 95," which simulated a biological terrorist attack on Washington D.C. and Norfolk, Virginia. Because of favorable wind conditions, the attack on Norfolk resulted in few casualties. Washington was not so lucky. A specially rigged crop-duster sprayed anthrax over the city which resulted in more than a million casualties. The player-participants concluded that if such an attack were to occur, the United States would retaliate with nuclear weapons against the "rogue" state held responsible.

How Prepared Are Our Cities?

With American cities and an unsuspecting civilian population at risk, what is the reaction of our elected public officials? In a word: minimal.

National security, public safety and medical emergency management experts, if asked, quietly acknowledge that our cities are unprepared to deal with a biological disaster. There is, nevertheless, a considerable effort to develop bio-crisis response teams at the Federal level. Last year, the President issued a classified Presidential Decision Directive [PDD '39'] which tasked the Federal Emergency Management Agency to lead an interagency review of the Federal response to a Nuclear, Biological or Chemical terrorist incident. Twenty-four Federal agencies have formed the **Catastrophic Disaster Response Group** which has responsibility for putting together an emergency response plan for an N/B/C disaster. After 20 months this effort is still in the review and analysis stage.

At State and local level, however, there is almost total ignorance about biochemical terror. If made aware of the problem at conferences or national briefings, governors and mayors across the nation have little interest in the problem. Most elected officials are reactive, rather than proactive, and will tell you that they have other priorities: potholes, snow removal, education and taxes. When asked about preparedness for a biological incident, most public officials invariably respond with an aversion to the issue and respond with some sort of variant of the old cliché: *That's a low-frequency, high impact problem. Talk to me about what is happening. Not what might happen.*"

About the only public figure openly willing to talk about biochemical terror is Sam Nunn of Georgia, who, before his retirement this year was acknowledged to be the Senate's foremost expert on national security and military matters. In public hearings of the Senate Armed Services Committee and in interviews with the media, he has been outspoken on this issue. "*Would-be terrorists out there already know about these weapons. It's imperative the American people know about them..... I'd be very surprised if any U.S. city can be protected.*"*

A terrorist attack will probably occur without warning. The first signs would be hundreds--or thousands--of ill and dying patients flooding hospital emergency rooms. Since the pathogen can be time-released, depending on a terrorist's motive and methods, reactive infections could be designed to erupt within minutes, hours or days.

By definition, a genetically engineered, bioweapon is, until its release, an unidentified, unknown killer. There are biosensors which can identify the more common ABOs such as anthrax and botulism, but for bioengineered toxins and viruses, the medical emergency response will take shape only when the dead provide their tissue for analysis. Even if the intelligence community had fair warning and knowledge of the genetic makeup of the agent, our public health agencies would be unable to administer vaccinations to millions of potential victims; nor is there any way to physically protect the civilian population with masks or decontamination centers.

At present emergency medical teams could barely protect themselves in the event of a significant germ release. HEPA masks and 1-5 micron filtered respirators are not available in sufficient quantities. Even if the resources of Hazmat units across the country were pooled together for a national emergency, they could muster no more than five or six hundred decontamination units. When world leaders gathered in New York to celebrate the 50th Anniversary of the United Nations last year, the City's Office of Emergency Management deployed six biochemical decontamination stations to cover the entire city.

What Can Be Done?

- ADMIT the "Germ Genie" is out of the bottle and increase public awareness of the bioterror threat. Public officials have a real problem with this issue. Budget constraints, a reactive rather than proactive mind-set and a general lack of understanding of the problem result in an "I don't want to talk about terrorism" attitude. This is especially true of elected officials who do not want to frighten their constituents with something that might not happen.

- INCREASE funding for local, emergency First Responders. The FY 1996 funding Congress allocated for an emergency response to a bioterror attack on our cities was a paltry $7 million. These funds are supposed to cover national health advisories, agent identification, hazard reduction, vaccines, decontamination, clinical medical support, high risk training and last, but not least, mortuary support. At present the O.E.P. budget for this is zeroed-out because the $7 million went for security training at the Olympic Games in Atlanta.

- REWRITE the '97-99 Senate/House Anti-Terrorism Bill. Over the next four years Congress has allocated a billion dollars for the counter-terrorism initiative. On the surface, this is all to the good. But look at the numbers. Of the Federal/State agencies allocated funding, the FBI receives $500 million--fully half, or the lion's share, of the revenues. The rest is dribbled out to 12 other agencies like Customs, Justice, Treasury. Last and least are America's cities, allocated $100 million over a four year period. From this, State and local emergency services must divide this sum among 20 major municipalities across America. So New York, Boston and Philadelphia, all prime targets, will receive only $250,000 annually to train and equip First Responders for the biochemical threat. Does this make sense?

- DEVELOP biochemical "pathogen alarms." Forget traditional counter-terrorist methods when it comes to bioterror. To deal with high-tech terrorists we need state-of-the-art biodetection systems which, while they may not prevent a deadly germ release, would at least minimize our vulnerability. The DOD's Advanced Research Projects Agency is funding technology to detect aerosolized agents in real-time. These sensors can relay an agent's DNA to a *germ weapon library* for identification. Biodetection technology will provide First Responders a significant advantage coping with an emergency biological killing zone. For FY 1994-96, the DOD allocated $172 million for a *Biological Weapons Monitoring And Detection* Program, the most effective of the Pentagon's counter-bioterror research programs. Civilians should ask that this research and technology be made available to the nation's Public Health and Safety agencies.

- SUPPORT the development of C/B Rapid Deployment Strike Teams. Since it is likely that State and local resources will be overwhelmed in the aftermath of a terrorist attack, an integrated Federal, State and local response is required. The Office of Emergency Preparedness, together with the DOD, EPA, FEMA, DOE and the CDC are in the process of organizing Federal Strike Teams with the necessary medical expertise, military support and dedicated equipment to cope with a major terrorist attack. These Strike Teams should have the capability, like the Nuclear Emergency Search Team, to be mobilized and on-site within three hours of notification a biochemical incident. The most highly equipped and prepared is the Marine Corps C/BIRF.

- PREPARE for the worst-case scenario. Stress post-incident, emergency medical training. If emergency management can handle bioterrorism, it can handle anything. Yet city officials, either for lack of awareness or naive refusal to take the threat seriously, will not plan, resource or provide serious training to respond to a bioterrorist incident. In the end, the cities will most likely put significant resources behind such an effort only after the civilian population suddenly and painfully becomes aware of the threat and then it will be too late.

Again a final thought from Senator Nunn: "*If nothing is done about this threat, I can see us holding hearings about a biological disaster in this country.....In the end I think we will be very fortunate to avoid this kind of disaster at some point.*"*

Frank Mc Donald is founder and Director of **BioMatrix**, a research and resource group on biological terrorism and bio-crisis management, based in Cambridge, Massachusetts.

ADVANCED CHEMICAL AGENT DETECTOR SYSTEMS

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The Terrorist Threat

- **WMD** (Weapons of Mass Destruction)
  - Nuclear
  - <u>Chemical</u>
  - Biological
- Explosives
- Information Systems
- Communication Systems

"Another Comment on Terrorism"

The loss inflicted by terrorists in both the World Trade Tower and Oklahoma City Federal Building bombings pale in what might have occurred had those <u>bombs been enhanced with chemical, biological or radiological products</u>. <u>The results would have been catastrophic and of disaster proportions</u>. This is the reality of the threat and it is always prudent to prepare for the worst case scenario. What we are dealing with is the potential for Weapons of Mass Destruction (WMD) to be used in the terror mode.

SO/LIC News May 1996 Bill Moore, MG USA (Ret.)

(Special Operations/Low Intensity Conflict)

○ THE TERRORIST THREAT

THREAT AGENTS

• NERVE GASES (GA, GB, GD) • BLISTER AGENTS (HD)	• EXTREMELY TOXIC (LCT50 = 50-1000 mg•min/m3) • EASILY PRODUCED • READILY TRANSPORTED AND DISPERSED

OTHER TOXIC AGENTS

• CHLORINE • PHOSGENE • HYDROGEN CYANIDE • HYDROGEN SULFIDE • ETC.	• 10 -100X LESS TOXIC • COMMERCIALLY AVAILABLE IN COMPRESSED GAS CYLINDERS • VERY VOLATILE (I.E., NEEDS A CONFINED SPACE TO BE EFFECTIVE)

o THE TERRORIST THREAT

POSSIBLE CHEMICAL DISSEMINATION METHODS

- SMALL EXPLOSIVE DEVICE
- RELEASE INTO VENTILLATION EQUIPMENT
- GAS CYLINDERS
- STOLEN MILITARY AIRBORNE/GROUND DISPERSAL DEVICES
- COMMERCIAL PESTICIDE SPRAYERS

Potential Targets

- Large Concentrations of Troops
- Prominent National Landmarks
- High Visibility Events
- Important Buildings
- Transport Facilities
  - Subways/Tunnels/Airports
  - Ships/Planes

SPECIFIC USE SCENARIOS

- **Overall Operational Applications**
  - Early Warning Alarm
  - Identification of Threat Gas
  - VIP/Personnel Protection
  - Suspect Mail/Package Inspection
  - Suspect Area Security Check
  - Consequent Management

Operational Lessons Learned

- <u>Increased Physical Security:</u> Appears to Deter/Reduce Number and Magnitude of Terrorist Acts
- Counterterrorism Efforts Forcing Terrorists to:
  - Take "Path of Least Resistance"
  - Devise Alternative Tactics
  - Select Softer Targets and/or Weapon Systems

    <u>Example:</u> **Tokyo:**
    - <u>"Sarin" Gas vs Explosives</u>
    - <u>Subway System vs Aircraft</u>

- OPERATIONAL NEEDS

- EARLIEST POSSIBLE CHEMICAL DETECTION & IDENTIFICATION
- RELIABLE THREAT INTELLIGENCE (FROM FEDERAL RESOURCES)
- INCIDENT RESPONSE PLAN
  - COMMUNICATIONS
  - EVACUATION PROCEDURES
  - COUNTERMEASURES
- TRAINING
- PROPER EQUIPMENT
  - SENSORS FOR EARLY DETECTION OF CHEMICAL RELEASE
  - PROTECTIVE GARMENTS/ MASKS
  - DECONTAMINATION EQUIPMENT
  - MONITORING EQUIPMENT TO AID DECONTAMINATION
  - ATROPINE

Summary

- "SAW" Chemical Agent Sensors
    - "State-of-the Art" Detector Systems
    - Solid State Detector Technology
    - Reliable
    - Field Tested
    - Easily Operated
    - "COTS"
    - Low Maintenance
    - Low Cost

OPERATION PROVIDE COMFORT COMMUNICATIONS—A PRECURSOR TO THE SOF C4I STRATEGY

John J. Meyer III
Colonel, USA

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21 January 1997

Communications for Operation PROVIDE COMFORT were established on an "as you go" basis and served a variety of joint and combined users. The requirements were extensive, the area of operations was widespread, and there was no communications infrastructure on which to build. The operation highlighted a number of C4I interoperability problems in joint and coalition operations. Some of the problems were corrected during the initial stages of the operation, some are still to be corrected. Several well known axioms were immediately reinforced. These included: the mission usually gets larger rather than smaller; airlift is always at a premium and there is competition for priority; maximum use must be made of existing national capabilities: and communications must be prioritized to ensure flexibility and availability.

The basic axioms were expanded as the operation continued and have formed the basis for the United States Special Operations Command's C4I Strategy. This strategy is a dynamic approach for satisfying the C4I needs of the special operator. The C4I Strategy consists of a doctrine based on the five principles of global, secure, mission tailored, value added, and joint; an architecture based on the tenets of seamless, robust, automated, full spectrum, and standards compliant; and an investment strategy based on the maximum use of commercial off-the shelf equipment, pre-planned technology insertion, equipment pooling, and maintenance by float.

Operations such as PROVIDE COMFORT pointed out the necessity of a comprehensive C4I strategy to ensure communications for our special operations forces (SOF) meet interoperability requirements for joint and coalition operations. The foundation provided by our cohesive strategy allows us to plan for and manage the constant and often unpredictable change inherent in the joint and coalition operations in which SOF will participate in the future.

In joint and coalition operations there is--in addition to providing basic communications connectivity--a need to be able to handle multiple levels of classification of information.

Additionally, there are the military and political needs to be able to easily exchange information with home station and the respective seats of political interest.

The United States now deploys forces as required for the operation. Frequently, only the portions of a unit that are required to be in the area of operations actually deploy. The remainder provide support from intermediate support bases (ISB) or from home station. Such tailoring of forces makes sound operational sense. To adequately support such an operation requires a communications system that completely blurs the line between tactical and strategic communications. Such a distinction may have served us well in the past, but is now passé.

During Operation PROVIDE COMFORT, USEUCOM extended the Defense Communications System (DCS) down to whatever level required service. This effort provided full interoperability for our joint forces as well as our coalition partners. It also effectively erased any demarcation between tactical and strategic communications.

The USSOCOM C4I Strategy goes one step farther and incorporates these needs by providing a communications system that uses a NSA approved scheme of encryption that provides protection for unclassified through Top Secret/Special Compartmented Information (TS/SCI). Coupled with the ability to readily vary the amount of bandwidth according to need, this flexible C2 system seamlessly extends any required DOD or SOF unique system from garrison down to the lowest tactical headquarters, e.g., Forward Operating Base (FOB), Naval Special Warfare Task Unit (NSWTU), or Air Force Special Operating Element (AFSOE).

In a coalition operation, communications services--either common or unique--can be readily provided to coalition partners as required. In a period of time where our coalition partners may well range across the entire spectrum of political ideology, the ability to easily tailor communications support to the immediate need is invaluable.

Arguably, the United States brings several fundamental and key assets to a coalition operation. These assets are leadership, logistics--this includes an inventory of "stuff" and the ability to deliver it anywhere on the globe--and communications. Our ability to establish communications on a global basis is unmatched. The trick is to be able to tailor support to the mission so it is relevant and does not require using all our air assets to move the equipment.

The USSOCOM C4I Strategy provides a tailorable global capability that is fully interoperable with DOD and commercial standards. It can provide a full complement of communications services at multiple levels of security from garrison to the lowest operational levels. Its modular approach allows an ability to completely tailor support to the operation. And, the deployable portion fits neatly onto a single pallet.

The capability is fielded today and has been engineered to be improved in an evolutionary manner. This strategy ensures continuity and currency of operational support now and into the 21st century.

In many ways, Operation PROVIDE COMFORT provided a blueprint for future joint and coalition operations. Today, USSOCOM's C4I Strategy has likewise produced a communications system that not only serves the needs of our special operations forces, but also provides a blueprint for DOD as well.

Below Line-of-Sight Threat Detection/Geolocation for Covert Infiltration/Exfiltration

William F. Santiff
Litton Systems Incorporated
Amecom Division

Covert Infiltration/Exfiltration of Special Operations aircraft is critical for mission success. The ability to arrive at an objective undetected and to return to friendly territory unmolested is an overarching consideration throughout the mission planning, mission rehearsal, and mission execution process.

SOF aircraft, both fixed and rotary wing, are by no means "stealthy". Covert operations depend a great deal on mission planning and tactics to achieve operational surprise. The worldwide proliferation of mobile and transportable radar systems and passive detection systems, however, present an ever increasing potential for lethal surprise.

Efforts to partially alleviate this threat are underway. Modifications to aircraft radar systems address the passive detection threat. Bringing Theater and National threat data on board SOF aircraft through receivers such as the Multi-mission Airborne Tactical Terminal (MATT) and the carry-on B-MATT receiver is a much needed first step, but sensor capacity and coverage limitations combined with processing and transmission latency delays conspire to make "Off-Board" threat data most useful for fixed radar installations and only a partial solution to the moveable/mobile radar problem.

Special operations fixed- and rotary-wing aircraft currently use conventional radar warning receivers (RWRs) supplemented by the APR-46 panoramic search receiver for on-board detection of hostile radars, surface to air missile defenses and AAA units. These current generation receivers have major drawbacks for SOF missions: the aircraft must be within the radar's line-of-sight in order to detect a signal, meaning the radar can also detect the aircraft. RWRs also provide an imprecise direction of arrival indication and a crude range estimate based upon received signal strength. The APR-46 merely indicates the presence of a radar signal with no location information at all.

Litton's Amecom Division in College Park, Maryland has developed advanced Below Line-of-Sight Electronic Support Measures (BLOS-ESM) technology which makes major breakthroughs in on-aircraft below line-of-sight threat radar detection and geolocation, (BLOSTD/G). The ability to consistently detect and geolocate threat radars while the equipped aircraft remains **completely terrain masked** behind ridge lines or "below the horizon" was conclusively proven during an extensive USAF flight test series conducted by Wright Laboratory in 1993.

Litton Amecom has produced and delivered tactical threat detection and geolocation receivers for three decades. Based on high precision radio frequency interferometry techniques, Amecom's receivers have long been operational on the RF-4C, E-2C, and SSN-688 class submarines and were also developed and successfully tested for EA-6B and A-12 Avenger II applications which did not enter production. Amecom's precision interferometer receivers typically measure the Direction of Arrival (DOA) of incoming signals to one half degree accuracy or better and use a mix of azimuth/elevation and bearings-only triangulation techniques to passively determine the range to the radar site and, thereby, its latitude and longitude (geolocation).

Litton Amecom won the contract for the Wright Laboratory flight test program in free and open competition against 11 competitors in late 1990. Working under subcontract to the aircraft integrator, Lockheed Aircraft Services Company - Ontario, Amecom brought three major technology breakthroughs together to create a "leapfrog" operational capability.

The first enabling technology was use of newly available **high sensitivity** preselector/low noise preamplifier components with adaptive receiver bandwidths. This allowed the receiver designers to increase the sensitivity of the BLOS ESM system so that it was 100 to 1000 times more sensitive than the typical installed RWR. This allows the receiver to detect and use very weak signals which have "bent" over ridgelines or over the horizon - operating in the so-called "diffraction region" (Figure 1). Diffraction is the phenomena which allows you to continue to receive the "line-of-sight" signals from FM broadcast stations even when you drive in hilly terrain or deep within a city's "concrete canyons". Just as in the case of your car's FM receiver, however, operation in the diffraction region increases the interfering effect of signal reflections on the weak direct path diffracted signal, i.e. multipath corruption. While the very nature of FM radio signals provides a great deal of inherent multipath rejection, radar signals offer ESM receiver designers no such help.

The second enabling technology was therefore implementation of a collection of **very sophisticated multipath mitigation** techniques and software algorithms developed internally by Litton. Leveraging the inherent measurement capabilities embodied in phase interferometer receivers, use of these powerful proprietary techniques was essential in determining whether each received radar pulse had been corrupted by reflecting off aircraft structure, the ground below, or mountainous terrain or was a useable signal received directly from the radar. While some useful parameters could be measured using the reflected multipath pulses, precision geolocation techniques require use of only the pure direct path pulses which the multipath mitigation techniques cull from the mass of direct and reflected pulses appearing at the receiver antennas.

The third enabling technology was a special rapid precision geolocation technique developed by Litton Amecom in the mid-1980's and patented in 1988: **Short Baseline Interferometry/Long Baseline Interferometry**, or SBI/LBI for short. A normal short baseline interferometer (SBI) antenna for the radar bands consists of 4 or 5 spiral antenna

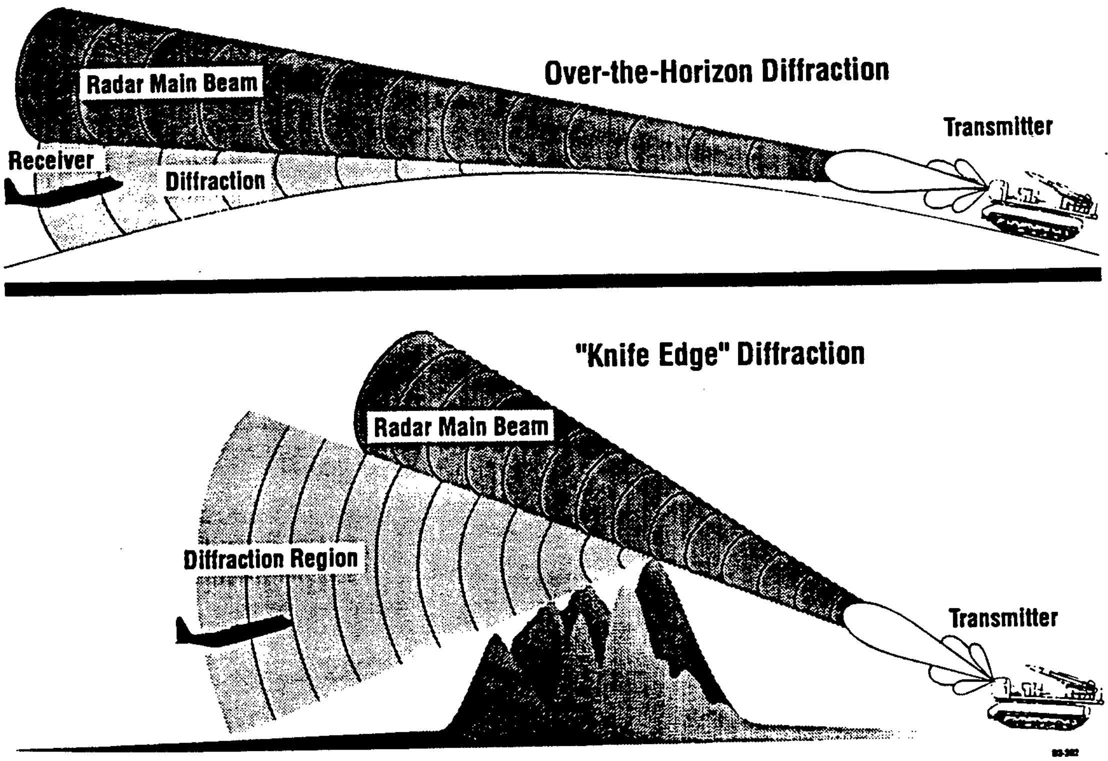


Figure 1. Below Line-of-Sight Reception in the Diffraction Region

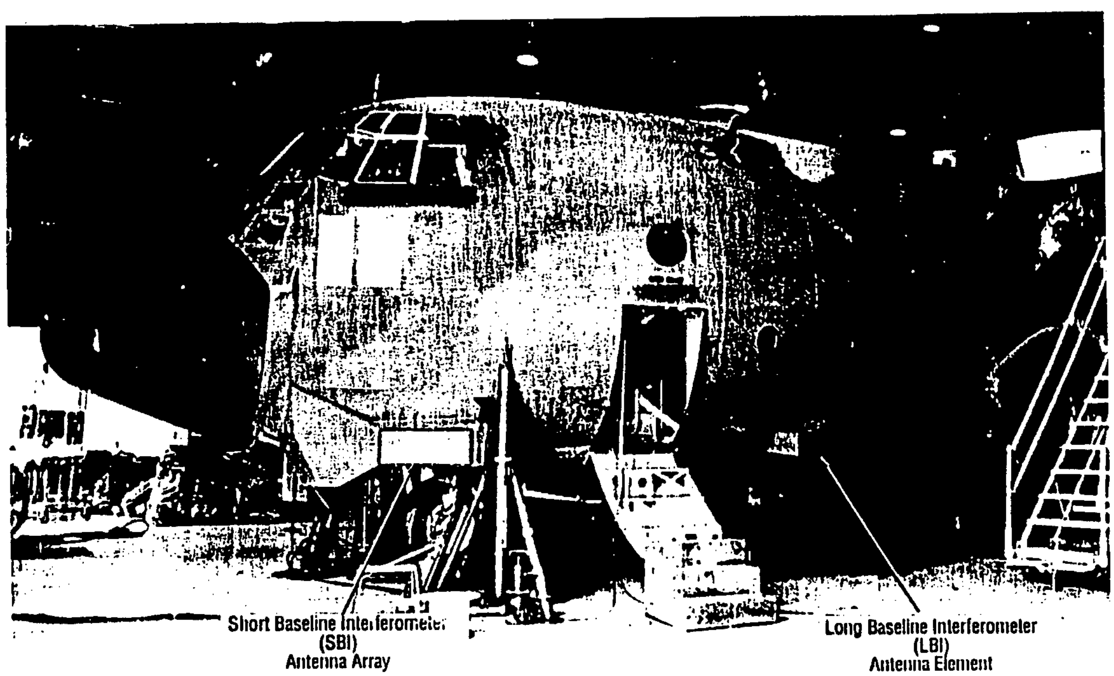


Figure 2. SBI/LBI Antenna Installation on Test Bed C-130

elements mounted in a row in an assembly 12 to 24 inches long. Such an antenna, when combined with a precision receiver, measures the angle of arrival of an incoming signal with an average accuracy of 0.5 degrees or better across its frequency range and field of view. In the early 1980's Litton Amecom engineers decided that placing an additional single element some distance away, perhaps 8 to 10 feet from the SBI, could create a long baseline interferometer (LBI) which could be used in cooperation with the SBI to speed up the passive ranging process. Company funds were allocated to develop and test the concept and it was found that a dramatic improvement in passive ranging timelines resulted. This improvement was directly related to the ratio of LBI to SBI lengths. For example: if the length of the SBI antenna array is 21 inches, an LBI located 210 inches from the SBI reference element provided a ten times improvement in passive ranging speed for a given level of accuracy, or a ten times improvement in ranging accuracy for a given time period, when compared with use of an SBI alone. Flight testing onboard a Litton Corporate Merlin IV turboprop aircraft verified the improved performance and the SBI/LBI method and apparatus were patented in 1988.

The Wright Laboratory sponsored flight test program, conducted in cooperation with USSOCOM and AFSOC, was conducted as a proof-of-concept test with limited funding. Consequently, Litton Amecom used an existing company-owned receiver, adding the high sensitivity modifications and SBI/LBI antenna arrays at the front end and a ruggedized high speed Sun workstation computer to run the company's advanced multipath and geolocation software in place of the receiver's original digital processor.

Figure 2 shows the antenna installation onboard the test bed aircraft, an NC-130E operated by the USAF at the Lockheed Ontario facility. The two rectangular SBI arrays were mounted port and starboard underneath the cockpit windows and swept back 60 degrees. This provided a high-accuracy field of view from dead ahead through 120 degrees left and right of the nose. The single LBI elements were mounted 12 feet aft along the fuselage and swept back 80 degrees. The equipment rack was mounted in the C-130's cargo compartment, located next to the CONSTANT SOURCE Operator's Terminal provided by BTG, Inc. which processed the off-board threat broadcast data and fused it with the on-board ESM threat reports for a total threat picture.

Over 110 hours of flight testing was accomplished during the summer and fall of 1993. After we solved our share of normal start-up bugs, the ESM system consistently detected and geolocated both FAA airport radars and the threat type radars at China Lake's electronic warfare test range (Echo Range) from behind and well below ridge lines in mountainous terrain and at up to three times the calculated radar "line-of-sight" distance over smooth terrain, proving the ability to detect radars while the radars can not detect the aircraft.

Figure 3 shows the terrain profile of a 60 NM long north to south flight test path extending from the Echo Range radar sites across Searles Dry Lake and Trona, over a pass, and into the Panamint Valley. The circled "x"s indicate the test bed aircraft locations when the BLOS ESM detected and geolocated the threat type radars on

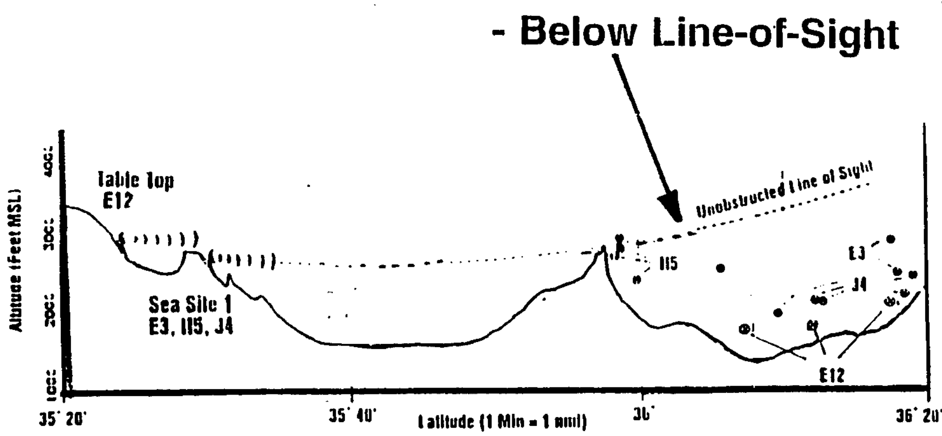
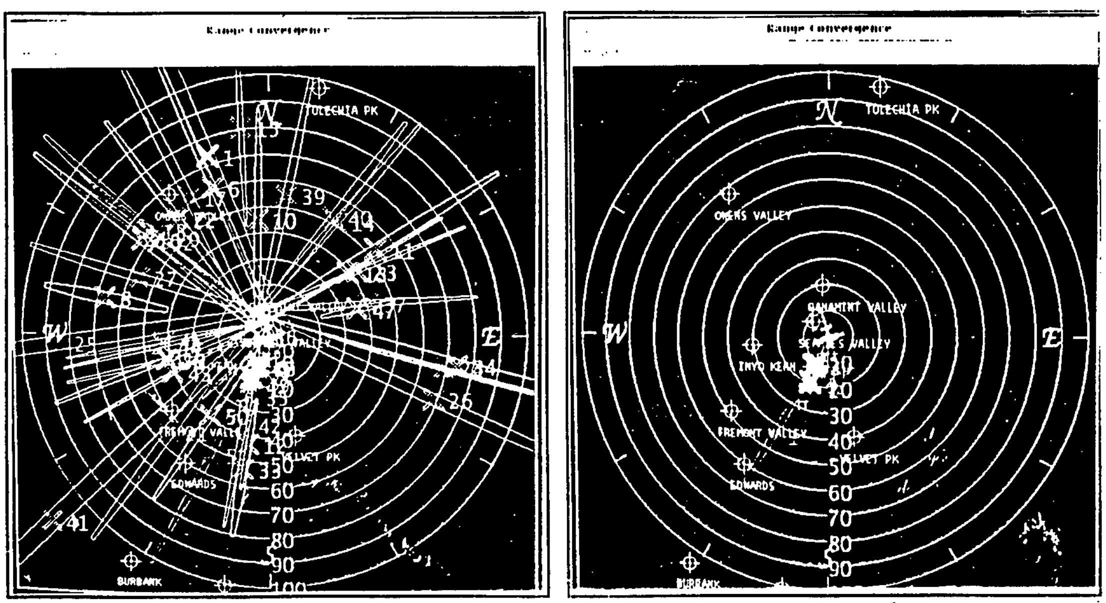


Figure 3. Sample Flight Test Results



a) Multipath Algorithms Turned Off

b) Multipath Algorithms Activated

Figure 4. Multipath Processing Effectiveness

different runs at different altitudes. Note the consistent performance below the radar's line of sight.

The test range provided a severe multipath environment. The strength of the multipath mitigation processing is shown in Figure 4 which was prepared by "replaying" the recorded flight test data with the special software turned off in the case on the left, and "on" in the identical case on the right. On this test run three threat radars were active. The left display shows what would be displayed by a standard RWR if it had the enhanced sensitivity of the ESM system.

The geolocation performance advantage of the SBI/LBI was also conclusively proven by the flight test program. Passive ranging accuracy is typically stated in terms of percent error for a given amount of true bearing spread (TBS) in order to normalize out the effects of aircraft speed and heading. TBS can be thought of by picturing yourself standing at the radar site being located and imagining compass bearings printed in the sky all around the horizon. An aircraft would have flown ten degrees of TBS when you see that it has moved ten degrees along the compass scale at the horizon, no matter how it got there or at what speed. A good SBI system will geolocate a radar to within 10% of range with 4 to 12 degrees of TBS depending on the radar's frequency and the angle off the SBI antenna's "boresight". The SBI/LBI in our testing achieved 10% range accuracies in under one-half degree of TBS and 2% to 3% accuracies in from one-half degree to 4 degrees of TBS.

In fact, the limiting factor in our geolocation performance turned out to be the use of a commercial GPS receiver on the test aircraft instead of a high precision military GPS receiver. The precision of our geolocation allowed accurate placement of the radar site within the Digital Terrain Data Base and real-time calculation of where the radar could and could not see relative to the aircraft's flight route and altitude.

The magnitude of the breakthroughs achieved were best summarized by an AFSOC Electronic Warfare Officer who climbed down off the aircraft after a four hour test mission and asked the first Litton employee he came across: "How in the (expletive deleted) do you guys see through mountains made of **solid (expletive deleted) rock?!**"

The breakthrough BLOSTD/G technologies proven in the flight test series have been incorporated into two modern ESM receiver families, the Litton Amecom LR-100 (Figure 5) and LR-500 (Figure 6). The LR-100 was designed using ruggedized COTS techniques and has been flight test proven onboard a Hunter UAV under sponsorship of the Joint Command & Control Warfare Center. The LR-500 was designed to full MIL-STD levels and was successfully flight tested by McDonnell Douglas on an F-15 for the USAF's Manned Destructive Suppression of Enemy Air Defenses program. In fact, both units worked as advertised on their very first flights.

Both are ready for adaptation to existing SOF aircraft and the CV-22 to provide the next generation detection avoidance capability to get the Special Operations troops in

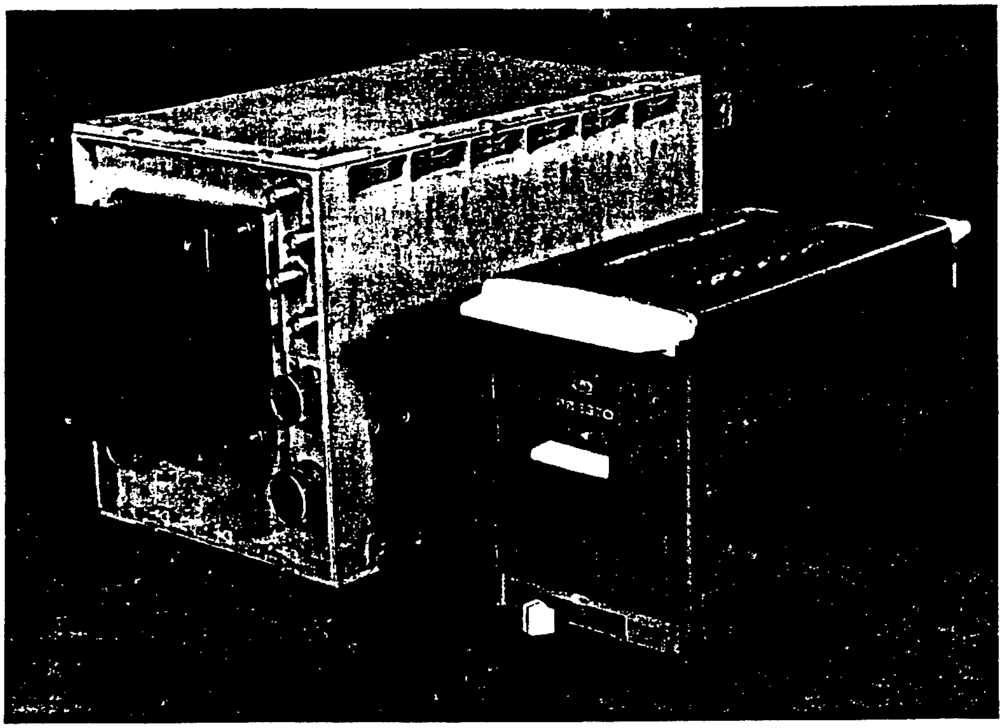


Figure 5. Model LR-100 Light Weight ESM Receiver

(The LR-100 is the one on the left)

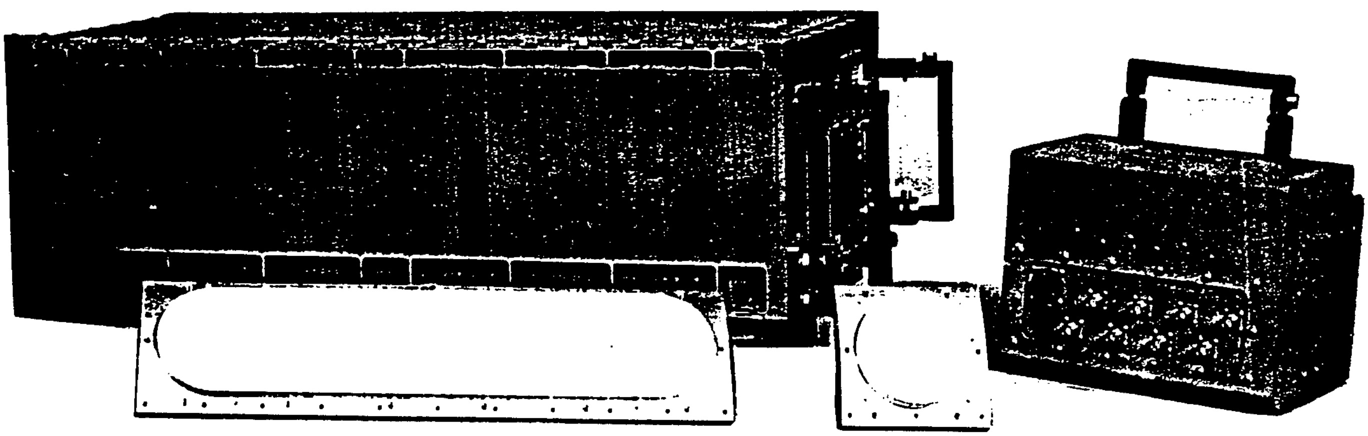


Figure 6. Model LR-500 Precision Direction Finding System ESM Receiver

the back of the aircraft to their objective without the adversaries knowing they are coming, and back home again without getting shot at, let alone shot up or shot down.

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Special Address

Coalition Warfare in Southern Europe

- Command Perspective of Operation Joint Endeavour, Operation Sharp Guard, Operation Deny Flight, and Operation Deliberate Force
- Implications for the Future

Featured Speaker: Admiral Leighton W. Smith, USN (Ret.)
Former Commander, Implementation Forces (IFOR), CINCUSNAVEUR, CINC Allied Forces Southern Command (AFSOUTH), Combined Joint Task Force Provide Promise

US INVOLVEMENT IN PEACE SUPPORT AND/OR HUMANITARIAN INTERVENTION MISSIONS

My purpose is to leave you with several thoughts, not the least of which would be that there will be many more of these types of operations, so we'd best figure out how to deal with them effectively.

It is Bosnia that I am most qualified to address so I shall use Operation Joint Endeavor and IFOR, or the Implementation Force as my model in discussing some of the key issues that must be considered when contemplating the use of our military in peace support or humanitarian intervention operations.

It has been said about Bosnia that "...no language can describe adequately the condition of the large portion of the Balkan peninsula... Serbia, Bosnia, Hercegovina and other provinces...political intrigues, constant rivalries, a total absence of all public spirit ...hatred of all races, animosities of rival religions and absence of any controlling power; nothing short of an army of 50,000 of the best troops would produce anything like order in these parts."

Disraeli spoke those words to the House of Lords in 1878. Any he wasn't far from wrong, though he should have added a couple of more imperatives. It was just over 50,000 forces from 35 nations that has brought order, or at least a semblance of order, out of chaos in that land over the past 11 months.

Let me tell you that commanding that lot for 7 months was quite an experience; a Navy admiral commanding NATO's first major land operation in a country that has no navy. Believe me, I was more often than not called "General" and I was watched closely by a lot of people.

I believe history will judge IFOR to have been successful in carrying out the military annex to the Dayton accords. What is not generally understood though, is that IFOR, a multi-service, multinational operation, was preceded by earlier operations that underscored the importance of three critical ingredients for success: robust (the force must have recognized military capability), rules of engagement, and resolve (say what you mean, then do it). If a commander has a capable force and the authority and resolve to use it, it is unlikely he will have to do so.

In a naval embargo/blockage, the Serbs tried to "fake" a problem to bring in the ship, LIDO. British had planned for such an event and executed their plan. The subs never tried it again. During the Scott O'Grady rescue, the use of resources demonstrated allied resolve to recover downed personnel. The lesson is don't give up on your people's ability to survive. When we send our men and women into harm's way, we'll by God come and get them if they get in trouble. This is the message we sent to Milosevic concerning US involvement. Thirteen Tomahawks and the air campaign showed our determination to stop the violence.

In Srebrenica, IFOR represented a galvanized international community with the delivery of 120mm mortar rounds into the market. On 28 August there was a political hesitation to hit the targets.

In peace support operations, there is a solid requirement for well-trained soldiers, sailors, airmen and Marines to be armed with the best our country can provide. IFOR predicted heavy losses, but went in strong. Our overkill was apparently enough to cause the warring factions to back off. Nor should IPTF's Peter Fitzgerald of IQBAL, Riza be criticized; he performed his mission with the limited resources he had available. IPTF and the UN are poorly mandated, not qualified and are without the proper equipment.

Many "locals" as well as media would question why IFOR did not get involved in "civil" type disputes. Soldiers are trained to be soldiers - not policemen.

The first days of operations started out in a robust manner. From day one, we showed that we mean business. We bulldozed six checkpoints - 2 each Serbian, Croatian, and Muslim. The Serbs didn't leave command posts, but what they had we bulldozed anyway. When we crossed the line, the Serbs tried to block us. Neither we nor the British were intimidated. Out in the naval area, the old man told me that he knew we were here to bring peace, not to tell me how to cook my pig. We demonstrated that even in the rural areas, people got the word. But we were not unopposed. The Danes took sniper fire and responded with 52 rounds of tank fire. Why that much? The response: "I only had 52 rounds!"

I could go on with more examples of how a properly equipped and trained force can very effectively alter the environment in a way that gives the political and civil bodies room to maneuver, but the important thing is that, in Bosnia, that has occurred without a single loss to hostile fire.

And while we do not have peace, we have instead an absence of war. A generation or more must pass before the "wrongs" that have been committed during the early 90s are forgotten. There is a chance for peace.

I have seen the results that can be achieved when our country exerts its leadership... and commits its forces. I can assure you that lives... thousands of lives, are saved as a result of that unbeatable combination. I hope that in listening to my replay of these events, you picked up several very important facts. One, all of them occurred in peace support operations... which are not necessarily peaceful operations. All of them were very limited in nature, but each had a very specific objective. And in every case, we relied on the technological edge that this country of ours provides to its armed forces, and in some cases to its allies.

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Plenary Session #2

Special Operations Forces in Coalition Operations

- State of SOF Planning and Policy
- Key SOF Concerns and Issues in the Conduct of Coalition Operations
- Opportunities and Risks Associated With the Increased OPTEMPO

Keynote Speaker: General Henry H. Shelton, USA
Commander in Chief
US Special Operations Command (USSOCOM)

GEN HENRY H. SHELTON
FOR THE
ADPA SYMPOSIUM
13 FEB 97

General Skibbie, General Moore, Colonel Henderson, thanks for the opportunity to speak to this group of military and industrial leaders, all dedicated to keeping America's military the greatest force for peace and war in the world.

I look for opportunities to tell the special operations story, and the ADPA SO/LIC Symposium is the premiere means to do so -- although speaking in Washington always reminds me of the Christian who was thrown into a lion's den. He immediately covered his face and started praying. After he wasn't eaten in a few seconds, he peaked through his fingers and saw the lion on its knees with its paws raised in prayer. He told the lion he was praying for salvation and asked the lion what it was doing. Saying Grace, answered the lion! Well, here I am -- back in the den.

The theme of this year's symposium is Coalition Operations, and while I'll speak to that, I'll also use this opportunity to review the status of special operations

forces, or SOF and the U.S. Special Operations Command, or SOCOM. And I'll also premiere our vision about the future of special operations, SOF 2020.

As the 10th anniversary of SOCOM nears, it's useful to take inventory of SOF, and to think about how they will contribute to future security environments.

The SOCOM Experience

After a decade of carrying out our missions, we have derived a series of lessons to guide our future; namely, regional orientation, readiness, programming and budget, RD&A, and command and control.

Regional Orientation. A post-Cold War security strategy that focuses on regional affairs, in war and Operations Other Than War (OOTW) requires a force that operates effectively in a variety of environments. SOF have enhanced regional orientation and language proficiency in many units and reinforced the capability of others. Because of the ability of SOF to work overseas, employment rates have steadily increased. In FY 96, alone SOF operated in 140 nations, providing ambassadors and geographic CINCs with

regionally-oriented support for country and area development plans. In an average week some two to three thousand SOF operators are deployed on 150 missions in 60 to 70 countries.

Readiness. Another lesson is the importance of maintaining a consistent and high state of readiness. This is a function of concentrating on core missions, quality people, and a continuous, regionally-oriented, joint training program. It is a focused program that allows Army, Navy, and Air Force special operators to be ready to work together as a joint team, performing those tasks that they know and understand, as soon as they arrive in an objective area in peace, conflict, or war.

Programming and Budgeting. Authority over programming and budget formulation and execution is essential in fielding a preeminent force. The congressional mandate to manage a separate major force program (MFP 11) ensures visibility for SOF program requirements in DOD as well as Congress. Because of the growing utility of SOF in a world characterized by multiple regional challenges, SOF funding

(less than 2 percent of the defense budget) has remained relatively stable, which has allowed us to retain adequate forces.

Research, Development, and Acquisition. The fourth lesson is that RD&A authorities are essential to having the best equipped force in the world. MFP 11 facilitates the fielding of major systems that will take SOF into the 21st century with the most capable equipment available.

Finally, USSOCOM is implementing a Command, Control, Communications, Computers, and Intelligence (C^4I) master plan for restructuring architecture and the way in which hardware will be procured and utilized to support the C^4I system. Just as important as systems acquisitions is quick reaction procurement which gives us the ability to equip the force with commercially available, non-developmental items in a matter of weeks or days.

Command and Control. USSOCOM has made notable advancements in command and control since 1987 that have focused on improving the integration of SOF and conventional forces. The most important improvement is the increased

capabilities of theater Special Operations Commands (SOCs). These sub-unified commands provide regional CINCs with the headquarters to plan and control the employment of joint SOF across the operational continuum from peace, through war, and during the transition back to peace. To support this growing role, USSOCOM has manned theater SOCs at 100 percent of peacetime authorization and provided interim quick reaction communications. In addition, all theater SOC commanders are now general or flag officers.

New World Order

Probably the most profound challenge that we confront is dealing with two competing and different kinds of threat. One is a well-equipped nation-state like Iraq, which requires high-tech capabilities that can quickly and precisely attack high-value targets and integrate coalition forces of diverse backgrounds, tasks which SOF accomplish extremely well. But we also face threats which have no viable conventional military or clear national centers of gravity, as illustrated by Somalia, Rwanda, and Haiti. Here threats are subnational groups, disintegrating social structures, disease, and environmental degradation. The

forces that are needed to fight a nation-state are usually not appropriate to address these latter threats.

The challenge is to field sufficiently flexible, adaptable forces that can operate effectively against both kinds of threat. This is a substantial task and requires regionally oriented, culturally attuned, and highly ready forces with extensive experience. SOF provide outstanding capabilities to assist conventional commanders in meeting a challenge from another state, as well as those as old as humankind.

SOF in the Future

Just as the rest of the U.S. military has defined their roles in the changing security environment, USSOCOM has looked to the future within the bounds of the National Military Strategy and Joint Vision 2010 (the Chairman of the JCS' vision document). SOF 2020 provides the long-range strategy for SOF missions, force structure, equipment, and capabilities into and beyond the year 2020. The document is our framework for building and maintaining the necessary

operational capabilities of future SOF. This vision incorporates our two most fundamental strengths - quality people with unequaled skills, and a broad-based technological edge - to ensure tomorrow's SOF are structured, trained, and equipped to counter diverse threats to our national security. SOF 2020 builds upon Joint Vision 2010 concepts as they apply to SOF, while complementing Service road maps for the future to optimize the synergy between SOF and conventional forces.

SOF will provide military capabilities not available elsewhere in the armed forces. Information operations and the counterproliferation of weapons of mass destruction will require that we lead in technology exploitation. In other cases, such as civil affairs, this will require fielded capabilities which take years to develop and refine. We will establish military-to-military and civilian contacts in potential areas of interest, principally through foreign internal defense. We will be ready and deployable so that we can be the very first to arrive, integrate, and operate. SOF will be regionally oriented - culturally, politically, and linguistically - while remaining a rapidly deployable

and agile joint force with capabilities ranging from humanitarian assistance to precision surgical strikes. To ensure SOF remain relevant and properly prepare them for future threats, we have outlined three parallel paths - professional development, technological innovation, and forward looking acquisition.

Professional Development

People are the most important key to our future success. Lifelong military learning experience must train for certainty but educate for uncertainty. We must maintain our traditional emphasis on high quality, rigorous training and reinforce it with effective education that encourages creative, thoughtful solutions to sensitive and high-risk situations. Future training programs must be linked to operational plans, integrate advanced technologies, capture the savings of simulations, and respond to evolving missions. Linking SOF training to operational plans is consistent with our regional and cultural orientation, training as we will fight, and reducing high personnel tempo rates. SOF will exploit advanced computer-aided

instruction, realistic interactive distributed simulations, and virtual reality environments to prepare units.

The SOF community must also prepare our people to remain professionally competitive by creating a comprehensive personal, team, and leadership development program. SOF initiatives will complement Service programs while offering other opportunities and experiences at the right time in a career. A positive by-product will be the increased opportunity to place the SOF perspective into fora throughout DOD, broadening our own people, while offering different 'takes' on new challenges.

Technological Innovation

We will look to emerging, leading edge technologies in such areas as mobility, sensing and identification, miniaturization, secure communications, advanced munitions, stealth, human enhancements, and robotics to increase the effectiveness and efficiency of our people and platforms. We will continue to identify and pursue key technologies that have the potential to satisfy future SOF requirements, maintain our core competencies, and meet emerging SOF missions. We will expand our initiatives to leverage

relevant technology products within DOD agencies, Services, national laboratories, and industry. And we must develop closer working relationships with organizations that will be driving technologies most relevant to our interests.

Acquisition

Our future acquisition process must acquire systems which will provide the best capability for effecting SOF missions based on performance and life cycle cost. Our acquisition strategy will embrace cost as an independent variable. This strategy will ensure the user remains involved in the tradeoffs between capability and cost during the entire acquisition process.

As we look at developmental versus off-the-shelf acquisitions, we will critically weigh developing a new system and its expected performance increase against the relative ease of fielding a proven commercial off-the-shelf (COTS) system. When state of the art performance is essential, we will undertake development and acquisition of new systems. We will acquire a number of other systems by integrating existing COTS components or subsystems in new ways to provide capabilities unique to SOF. We will use

COTS equipment when feasible and pursue development when we must. The future will bring a streamlined acquisition process that incorporates logistics 'supportability,' and SOF will lead in its implementation.

The Way Ahead

Let me reinforce SOF 2020 by stressing that as SOCOM moves into the 21st century, we will keep apace of the security environment. But in every phase of that evolution the focus will be on people. The most important ingredients of success are the personnel who we commit to diverse missions. We continually seek innovative ways to select the right people, train them, and develop them throughout their professional careers. The best piece of equipment will not accomplish the mission without the right person operating it, and the right person will find a way to succeed using almost anything at hand. All our programs assume that we will have the right people in the right place with the right training.

The range of capabilities, size, and strategic reach of SOF today are unmatched anywhere in the world today, and offer the Nation unparalleled capabilities to influence the international security environment tomorrow. USSOCOM is

evolving in this environment. Instead of sticking to comfortable defense models of the past, we are vigorously pursuing innovative ways to promote national security. We are developing equipment that will enable our most important asset, the Quiet Professional, to perform in difficult exigencies. USSOCOM has moved beyond the Cold War into a new environment in which we may not have all the answers, but in which we provide SOF with unique and valuable capabilities, anywhere, anytime.

QUIET PROFESSIONALS

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Special Address

Military/Industry Integration in Support of Future SOF Operations

- Technology Objectives
- Contracting for Military Operations Support
- Joint Communications/Electronics/Sensors/ Information Systems Acquisition
- Future Acquisition Trends

Featured Speaker: Mr. Edward G. Elgart
Director
CECOM Acquisition Center

CONTINGENCY CONTRACTING IN OPERATIONS OTHER THAN WAR

Presenter: Mr. Edward G. Elgart

Director, CECOM Acquisition Center
Communications-Electronics Command

13 February 97

AGENDA

DEFINITION, PHILOSOPHY

AMC ROLE

LOGCAP

UMBRELLA CONTRACT

REGULATIONS & PUBLICATIONS

PERSONNEL & TRAINING

CONCLUSION

DEFINITION OF CONTINGENCY CONTRACTING

"DIRECT CONTRACTING SUPPORT TO TACTICAL AND OPERATIONAL FORCES ENGAGED IN THE FULL SPECTRUM OF ARMED CONFLICT AND MILITARY OPERATIONS OTHER THAN WAR, BOTH DOMESTIC AND OVERSEAS"

TYPES OF CONTINGENCIES

A DEPARTMENT OF DEFENSE CONTINGENCY OPERATION MAYBE DECLARED EITHER BY:

THE PRESIDENT OR THE CONGRESS WHEN MEMBERS OF THE UNIFORMED SERVICES ARE CALLED ON ACTIVE DUTY (RESERVE COMPONENT MOBILIZATION) UNDER TITLE 10, UNITED STATES CODE OR ANY PROVISION OF LAW DURING A DECLARED WAR OR NATIONAL EMERGENCY

OR

SECRETARY OF DEFENSE WHEN MEMBERS OF THE ARMED FORCES MAY BECOME INVOLVED IN MILITARY ACTIONS AGAINST ANY ENEMY OF THE UNITED STATES.

IAW 10 USC 10(A)(13)

CONTINGENCY CONTRACT PHILOSOPHY

CONTRACT MUST INCLUDE ALL FORESEEABLE SCENARIOS

CONTRACTOR SELF-SUFFICIENT TO EXTENT PRACTICAL

COMMANDER'S CONCERNS

- RESPONSIVENESS
- REQUIREMENTS MET VIA CONTINGENCY CONTRACTS

CONTINGENCY CONTRACTING QUESTIONS

Typical questions a Contracting Officer and Contractor may ask a CINC-

WHERE IS THE PLACE OF PERFORMANCE?

WHAT ARE THE LIVING AND WORKING CONDITIONS?

WHO WILL PROVIDE MESSING AND BILLETING, PHYSICAL SECURITY, MEDICAL SCREENING, MEDICAL CARE AND INSURANCE?

HOW MUCH PREPARATION DO YOU WANT THE CONTRACTOR TO DO AHEAD OF TIME?

CONTINGENCY CONTRACTING QUESTIONS (CONTD)

TYPICAL QUESTIONS A CONTRACTING OFFICER AND CONTRACTOR MAY ASK A CINC-

HOW FAST CAN THE CONTRACTOR REACT?

WHAT HAPPENS WHEN A CONTRACTOR EMPLOYEE DECIDES TO QUIT BECAUSE HE DOES NOT LIKE THE LIVING CONDITIONS, PHYSICAL HAZARDS, ETC?

WHO IS PAYING FOR ALL OF THIS?

ROLE OF ARMY MATERIEL COMMAND IN CONTINGENCY CONTRACTING

- PROVIDES FA 97 OFFICERS AND GS 1102s TO AUGMENT CONTRACTING ACTIVITIES IN THE CONTINGENCY AREA
- SOLICITS, AWARDS, AND/OR MODIFIES CONTRACTS FOR PERFORMANCE IN THE CONTINGENCY AREA
- PREPARED AMC-P 715-18, AMC CONTRACTOR DEPLOYMENT GUIDE FOR CONTRACTING OFFICERS
- EXECUTING LOGCAP PROGRAM MANAGEMENT

LOGISTICS CIVIL AUGMENTATION PROGRAM (LOGCAP)

OBJECTIVE IS TO PRE-PLAN FOR THE USE OF CIVILIAN CONTRACTORS TO PERFORM SELECTED SERVICES IN WARTIME TO AUGMENT ARMY FORCES I.E. DESERT STORM, SOMALIA, HAITI, BOSNIA

PROVIDE RAPID CONTRACTING CAPABILITY FOR CONTINGENCIES

PRIMARY TOOLS ARE:

- UMBRELLA CONTRACT
- CONTRACTS WITH "CONTINGENCY CLAUSES"

LOGCAP UMBRELLA CONTRACT

ARMY MATERIEL COMMAND MANAGES LOGCAP CONTRACT WITH

- DYNCORP AEROSPACE TECHNOLOGY
- AWARDED 30 JAN 97
- FIRM FIXED PRICE/COST PLUS AWARD FEE

ARMY CORPS OF ENGINEERS MANAGES LOGCAP CONTRACT WITH

- BROWN AND ROOT SERVICES CORPORATION
- CPAF
- TIL MAY '97

PROVIDE CAPABILITY TO EXECUTE PRE-PLANNED SUPPORT

LOGCAP UMBRELLA CONTRACT - STATEMENT OF WORK

DYNCORP

PLAN FOR AND, ON ORDER, WITHIN 15 DAYS, INITIATE SPECIFIED LOGISTICAL AND CONSTRUCTION SUPPORT FOR 180 DAYS TO A FORCE OF UP TO 25,000 TROOPS ARRIVING THROUGH AIR AND SEA PORTS OF DEBARKATION. PROVIDE SUPPORT IN ONE REAR AND SEVEN FORWARD AREA BASE CAMPS

BE PREPARED TO EXTEND OPERATIONS BEYOND 180 DAYS FOR UP TO 50,000 TROOPS

SUPPORT DESIGNATED MACOMS IN THEIR PLANNING PROCESS AND IN THE CONDUCT OF EXERCISES

LOGCAP UMBRELLA CONTRACT - TYPES OF SUPPORT

DYNCORP

CONSTRUCTION/MAINTENANCE OF BASE CAMPS

SERVICES INCLUDE BUT NOT LIMITED TO: PROVISION OF WATER, ICE, MESSING, BILLETING, SHOWERS, LATRINES, TRASH, LAUNDRY, EQUIPMENT (BUSES, TRUCKS, WRECKERS, MATERIEL HANDLING EQUIPMENT, GENERATORS) W/OPERATORS

CONTRACTOR RESPONSIBLE FOR MOVEMENT AND SUPPORT OF ALL ASSETS USED BY CONTRACTOR

LOGCAP UMBRELLA CONTRACT - USE

SOMALIA

RWANDA

HAITI

SOUTHWEST ASIA

BALKANS

LOGCAP UMBRELLA CONTRACT - SOMALIA, RWANDA, HAITI

SOMALIA - CONTRACTOR MOBILIZED DEC 92

$106M(US/UN)

CAMP CONSTRUCTION, MAINTENANCE, AND OPERATION; POWER PRODUCTION; WATER PRODUCTION AND DISTRIBUTION; FOOD SERVICE; LAUNDRY, SHOWER AND LATRINE SERVICES; SOLID WASTE MANAGEMENT; TRANSPORTATION; LINGUIST SUPPORT

RWANDA - CONTRACTOR MOBILIZED JUL 94

$6.4M

WATER PRODUCTION AND DISTRIBUTION

HAITI - CONTRACTOR MOBILIZED SEP 94

$112M

CAMP CONSTRUCTION, MAINTENANCE, AND OPERATION; FACILITY CONSTRUCTION AND MAINTENANCE: CLASS I, III, AND IV HANDLING AND STORAGE; WATER PRODUCTION AND DISTRIBUTION; FOOD SERVICE; LAUNDRY, SHOWER, AND LATRINE SERVICES; A/DACG AND SPOD OPERATIONS; TRANSPORTATION

LOGCAP UMBRELLA CONTRACT - SOUTHWEST ASIA, BALKANS

SOUTHWEST ASIA - CONTRACTOR MOBILIZED OCT 94

$13.1M

WASTE WATER TREATMENT PLANT REPAIR; BULK AND RETAIL POL HANDLING AND DISTRIBUTION; FOOD SERVICE; LAUNDRY SERVICE; TRANSPORTATION OF CARGO AND PASSENGERS

BALKANS - CONTRACTOR MOBILIZED OCT 95

$450M

CAMP CONSTRUCTION, MAINTENANCE, AND OPERATION; FACILITY CONSTRUCTION AND MAINTENANCE; CLASS I, III, AND IV HANDLING AND STORAGE; WATER PRODUCTION AND DISTRIBUTION; FOOD SERVICE; LAUNDRY, SHOWER, AND LATRINE SERVICES; A/DACG AND SPOD OPERATIONS; TRANSPORTATION

OTHER EXISTING UMBRELLA TYPE CONTRACTS

AGENCY	CONTRACTOR
FORSCOM	DYNCORP BROWN & ROOT
AIR FORCE CONTRACTOR AUGMENTATION PROGRAM	AWARD FEB '97
CONTRACTOR FIELD TEAM AIR FORCE	PENDING AWARD

UMBRELLA TYPE CONTRACT VENDOR CHARACTERISTICS

LARGE VENDORS PROVIDING ENTIRE RANGE OF SERVICES WITH AN EXTENSIVE INTERNATIONAL CAPABILITY

TYPICALLY SUBCONTRACT WITH LOCAL VENDORS (IN THE CONTINGENCY AREA)

WHAT CAN SMALL BUSINESS DO?

FIND A NICHE AND PARTNER WITH LARGE VENDORS

BE VERY COMPETITIVE IN TERMS OF PRICE, RESPONSIVENESS, AND RELIABILITY

PROMOTE CAPABILITY TO USERS WHO MAY DEPLOY AND TO THE THEATER PROCUREMENT OFFICE

REGULATIONS, PUBLICATIONS, AND POLICIES

FAR, DFARS, AND AFARS

DA PAM 715-XX, CONTRACTOR DEPLOYMENT GUIDE

AMC PAM 715-18, AMC CONTRACTOR DEPLOYMENT GUIDE FOR CONTRACTING OFFICERS

AR 700-137, LOGISTICS CIVIL AUGMENTATION PROGRAM (LOGCAP)

DA PAM 715-XX
CONTRACTOR DEPLOYMENT GUIDE

DA DCSLOG INITIATIVE

PENDING PUBLICATION

DESIGNED FOR CONTRACTOR EMPLOYEES AND COMMANDERS

DISCUSSES EMPLOYEE AND COMMANDER EXPECTATIONS, ROLES AND RESPONSIBILITIES

SUBJECT AREAS INCLUDE COMMAND AND CONTROL, MESSING, BILLETING, MEDICAL CARE, DEPLOYMENT PROCESSING

AMC-P 715-18

AMC CONTRACTOR DEPLOYMENT GUIDE FOR CONTRACTING OFFICERS

PUBLISHED 08 JUL 96

DESIGNED FOR AMC CONTRACTING OFFICERS

INCLUDES SAME CHAPTER TOPICS AS DA PAM

NOT A POLICY OR MANDATORY REQUIREMENT

AR 700-137 Logistics Civil Augmentation Program

LOGCAP IMPLEMENTATION CONCEPTS, RESPONSIBILITIES, POLICIES & PROCEDURES

PLANNING, PROGRAMMING, BUDGETING & EXECUTION REQUIREMENTS

PREPARATION, AWARD AND TESTING PROCEDURES

PRE-PLANNING

THE ARMY ENSURES PLANNING FOR CONTINGENCY ACTIONS IN ITS OPERATIONAL PLANS BY:

- ID OF RESOURCES FOR MOBILIZATION
- CONTINGENCY CONTRACTS
- CONTINGENCY CLAUSES
- DEVELOP CONTRACT CAPABILITY TO BE MOBILIZED
- COORDINATE REQUIREMENTS WITH VARIOUS THEATERS
- PROGRAM AND BUDGET FOR CONTINGENCIES

CONTINGENCY CONTRACTING OFFICERS

CAREER FIELDS

- FA-97 OFFICERS
- NON-COMMISSIONED OFFICERS
- GS-1102 CONTRACTING OFFICERS

TRAINING

- CONTINGENCY CONTRACTING COURSE

CON 234
CONTINGENCY CONTRACTING COURSE

DAU COURSE

- PRIMARY SCHOOL - 2 WEEKS
- DESIGNED TO TRAIN CONTINGENCY CONTRACTING OFFICERS

LOGCAP BUSINESS OPPORTUNITIES

* OPPORTUNITIES LIMITED TO LOGCAP CONTINGENCY EVENTS
* BUSINESSES WILL NEED TO ESTABLISH GLOBAL PRESENCE TO SUPPORT MATERIAL/SERVICE NEEDS OF LOGCAP CONTRACTOR DURING CONTINGENCIES
* PRIME LOGCAP CONTRACTOR WILL ESTABLISH LOGCAP DATABASE TO IDENTIFY SOURCES AND RESOURCES

CONCLUSION

PRE-PLANNING BY COMMANDERS, CONTRACTING OFFICERS AND CONTRACTORS A NECESSITY

LOGCAP UMBRELLA TYPE CONTRACT IS A TOOL

BUSINESS OPPORTUNITIES POTENTIALLY AVAILABLE TO CONCERNS WILLING TO ESTABLISH GLOBAL MARKETS FOR THEIR SUPPLIES OR SERVICES

CONTINGENCY CONTRACTING IS GROWING IN IMPORTANCE

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Thursday Panel
(Afternoon)

Panel: The Command Perspective
- Key Issues and Operational Concerns
- How SOF Can Maintain the "Leading Edge"

Moderator and Speaker: Rear Admiral Raymond C. Smith, USN
Chief of Staff, USSOCOM

Panelists:

Lieutenant General Peter J. Schoomaker, USA
Commanding General, USASOC

Rear Admiral Thomas Richards, USN
Commander, NAVSPECWARCOM

Colonel Eugene Ronsick, USAF
Director of Staff, AFSOC

Major General Michael Canavan, USA
Commander, JSOC

General Moore, General Potter, Colonel Henderson, thank you for the opportunity to speak and moderate the USSOCOM "COMMAND PERSPECTIVE" PANEL. Also, I would like to thank all of you, the audience, for attending. It is obvious that there is much interest in special operations capability and we truly appreciate your interest and support.

For those of you who may not know me, I'm Ray Smith, the Director of Resources at USSOCOM. And, with me as panelists are the commanders, or representative, of our components.

LTG Pete Schoomaker, Commanding General, USASOC; MG Mike Canavan, Commander, JSOC; RADM Tom Richards, Commander, NAVSPECWARCOM; and Col Gene Ronsick, Chief of Staff, AFSOC.

Before I invite you to ask questions of the panelists, let us provide you with "Food for Thought" on the "state" of the United States Special Operations Command. This will provide you with a perspective of where we are today. Coupled with SOF Vision 2020, our view of special operations in the future, which General Shelton presented this morning, it should generate some good discussion and questions.

Presently, SOF numbers at about 44 thousand active and reserve personnel, of which roughly 58% are Army, 26% Air Force, and 16% Navy. Though these numbers have been relatively stable over the past five years, our OPSTEMPO and PERSTEMPO have increased substantially. Last week we were carrying out 250 mission in 64 different countries. From 1992, when we started to keep statistics, to the present, the weekly average of SOF personnel deployed has increased by about 130%. While we are very busy, the morale of our soldiers, sailors, and airmen is extremely high. Having said that, we are closely studying the implications of this increased tempo on our people.

As all of your know, SOF is a finite resource. Since I do not see our authorized end strength increasing substantially in the future, the military leadership, whether the special operations commander, or the theater commander, must continue to ensure SOF utilization is always appropriate to the mission and ask the question, "Is this a mission that could be accomplished by the conventional force?" Although our PERSTEMPO is steadily increasing, our budget has not. In fact, TOA has decreased 11 % from FY 92 to FY 97. Though this has presented us with challenges, it is evident Congress and DoD recognize our relevance and the value SOF brings to the national and military strategy. Over the years, we have faired comparatively very well. In fiscal year 97, USSOCOM received Congressional budgetary support including plus-ups of $111 million dollars above the President's budget and based on fiscal guidance, I expect out TOA will remain stable at roughly #3.1 billion through the year 2003.

Our FY 97 budget is roughly appropriated as follows: 46% to MILPAY, which goes directly to the Services for execution, 34% O&M, 15% Procurement, 4% RDT&E and 1 % for MILCON. Though the "investment" slice of our FY 97 budget is smaller than in

the past, we will see an increase in procurement dollars in the future to continue SOF modernization. These dollars will complete system improvements of our new AC 1300 gunships and MS130H Talons and fund new communications equipment buys and other aircraft improvements. We will also buy our last six (6) MKV Special Operations Craft giving us a total of 20.

These future procurement dollars will also buy six (6) ASDS and fund some minor MODs to host submarines. The first ASDS is expected to be operational in FY 98, then one per year after that.

We will also be procuring a new Naval Special Warfare Rigid Hull Inflatable Boat. Source selection evaluations are presently in progress in Tampa.

To replace some of our aging rotary wing and Talon aircraft, used for infil and exfil, we are buying 50 CV-22 (the SOF version of the Osprey) VSTOL aircraft beginning in FY 2005.

We are committed to maintaining the technological edge over our adversaries. We will continue to fund tactical system development but our acquisition folks will also be working hard to encourage the US and DoD technology bases to focus of SOF deficiencies and goals, as well as identifying and inserting relevant existing leading-edge technology developed by other agencies into SOF systems.

In 1995, SOCOM was tasked with organizing, training, equipping and otherwise preparing SOF to conduct operations in support of US Government counterproliferation objectives. CP is one area where significant technology challenges exist. We have identified 39 technology deficiencies which require resolution in order to meet evolving CP taskings. These identified CP requirements and supporting technology development projects, address finding, tracking and neutralizing a potential adversary's Weapons of Mass Destruction (WMD) capabilities and providing SOF the capabilities to carry out this mission in all environments.

Before I turn over the microphone to our panelists, I would like to share with you SOCEUR success story that typifies the great work our SOF operators do day in and day out, worldwide. As many of you may know, SOCEUR was tasked last April 3rd to assist in the search and rescue for US Commerce Secretary Ronald Brown's aircraft near Dubrovnik, Croatia.

In weather conditions so bad, helicopters had to search by hovering up and down the mountainsides, MH-53Js of the 352d Special Operations Group with Air Force Special Tactics troops, Navy Seals and Army Special Forces aboard, found the crash site. Given command and control of the recovery effort, Special Operations Command-Europe (SOCEUR) organized the Croat, French, British, Spanish, German, and US forces that went about the grim duties of searching for and recovering the remains of the 35 people on the airplane.

What you may not know is, after that task, and enroute to home station, Mike Canavan, then commander of SOCEUR, was notified of the Monrovia, Liberia non-combatant evacuation mission. When his aircraft landed, Mike was briefed, did some initial planning, and launched -- never having left the airfield. SOCEUR's mission was to deploy critical elements into the are of operations; establish an intermediate staging base in Freetown, the capitol of Sierra Leone, from where evacuees could be transported to a safe haven in Senegal; secure the US Embassy in Monrovia; and evacuate American citizens and third country nationals.

Again demonstrating the benefits of continuous joint planning, training and operations, SOCEUR quickly assembled a team of special operations aircraft, Air Force, Army and Navy Special Operators (augmented by conventional elements) to accomplish the mission. It called for and received fixed wing and helicopter assets from its components and from the continental United States to create an air bridge from Monrovia to the intermediate staging base in Freetown.

All told, the MH-53Js and MH-47Ds tallied 354 flight hours in 65 sorties, more than a third of which were on night vision goggles. Those sorties rescued 2115 people from 71 countries before larger conventional forces arrived to relieve the special operators and evacuate the several hundred people who remained.

The professionalism of the troops was extraordinary; in one case, a SEAL sniper was watching an armed Liberian when he appeared to level his rocket propelled grenade launcher at the US Embassy Compound a clear and distinct "trigger" event within the rules of engagement. With the discipline that comes from training and experience, the SEAL did not fire, but waited the second or two it took to reveal the Liberian had merely shifted his hold on the RPG so he could eat a sandwich he had in his other hand. The Liberian will never know how close he came to becoming a statistic.

The evacuation was handled with skill that impressed all observers. A very senior official in the White House told General Shelton, Special Operations Forces don't get the credit they deserve because they make everything seem easy.

Nobody asked if SOCEUR and its components were ready to go; when they were ready and they made us all proud.

SOF is relevant and ready today. And, based on the Strategy Development I've been involved with at the Quadrennial Defense Review (QDR) SOF will become even more relevant in the future, and will remain ready by focusing on professional development, innovation and forward looking acquisition.

ADPA SO/LIC Symposium

Colonel Gene Ronsick

Director of Staff

AIR FORCE SPECIAL OPERATIONS COMMAND

AFSOC

1/29/97 9:53
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WHERE ARE WE GOING?

- CV-22
- AC-130U
- WEST COAST BASE
- FID
- RESERVES
- DEVELOP OUR PEOPLE
- CHANGE OLD “COMMANDO” MINDSETS WITHIN SPECIAL OPS AND IN CONVENTIONAL AIR FORCE

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WEAPON SYSTEM UPDATE

CV-22 OSPREY

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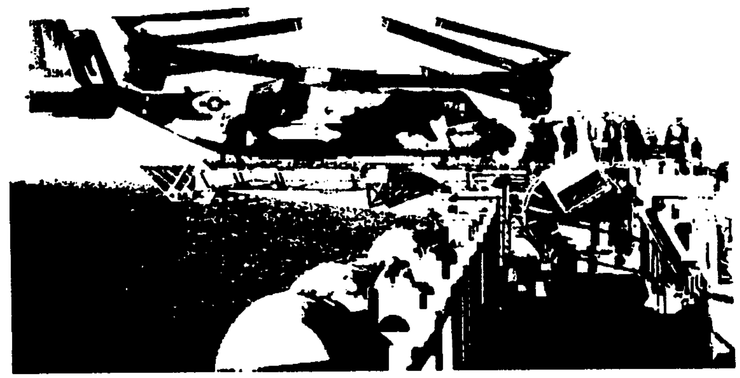
WEAPON SYSTEM UPDATE

CV-22 OSPREY



- CV-22 IS BASIC MV-22 WITH SOF UNIQUE EQUIPMENT FOR:
  - TERRAIN FOLLOWING/AVOIDANCE (TF/TA)
  - THREAT AVOIDANCE
  - COMMUNICATIONS
  - STATE-OF-THE-ART DEFENSIVE AVIONICS SUITE

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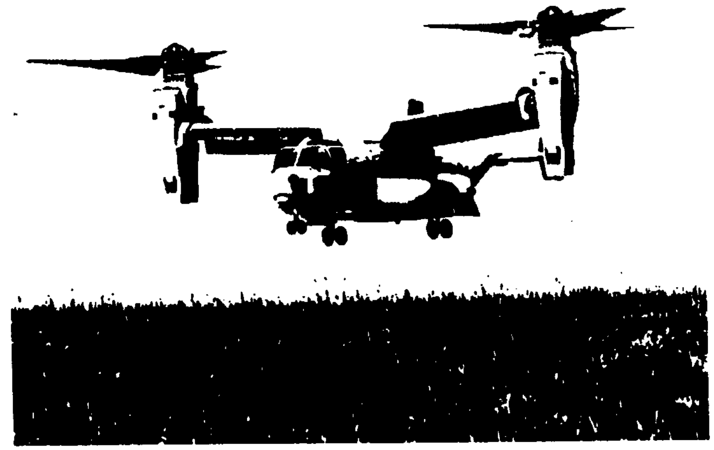
WEAPON SYSTEM UPDATE

CV-22 OSPREY



- CV-22 DELIVERY SCHEDULE:
  - FY 2003 - 4
  - FY 2004 - 6
  - FY 2005 THROUGH 2009 --- 7 PER YEAR
  - FY 2010 - 5

TOTAL = 50

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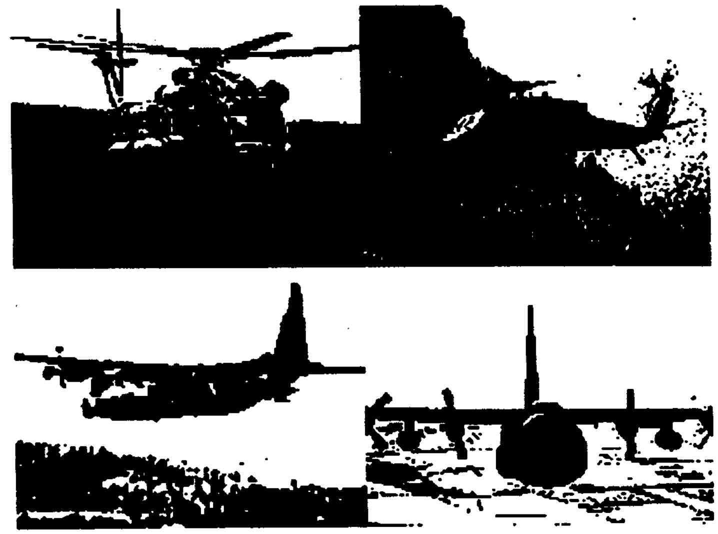
WEAPON SYSTEM UPDATE

CV-22 OSPREY



- CV-22 WILL REPLACE:
  - ALL MH-53J PAVE LOWS
  - ALL MH-60G PAVE HAWKS
  - ALL ACTIVE DUTY MC-130E COMBAT TALONS
  - ALL BUT 10 MC-130P COMBAT SHADOWS
- PLAN ON HAVING CV-22 AT EUCOM, PACOM, AND CONUS BASES

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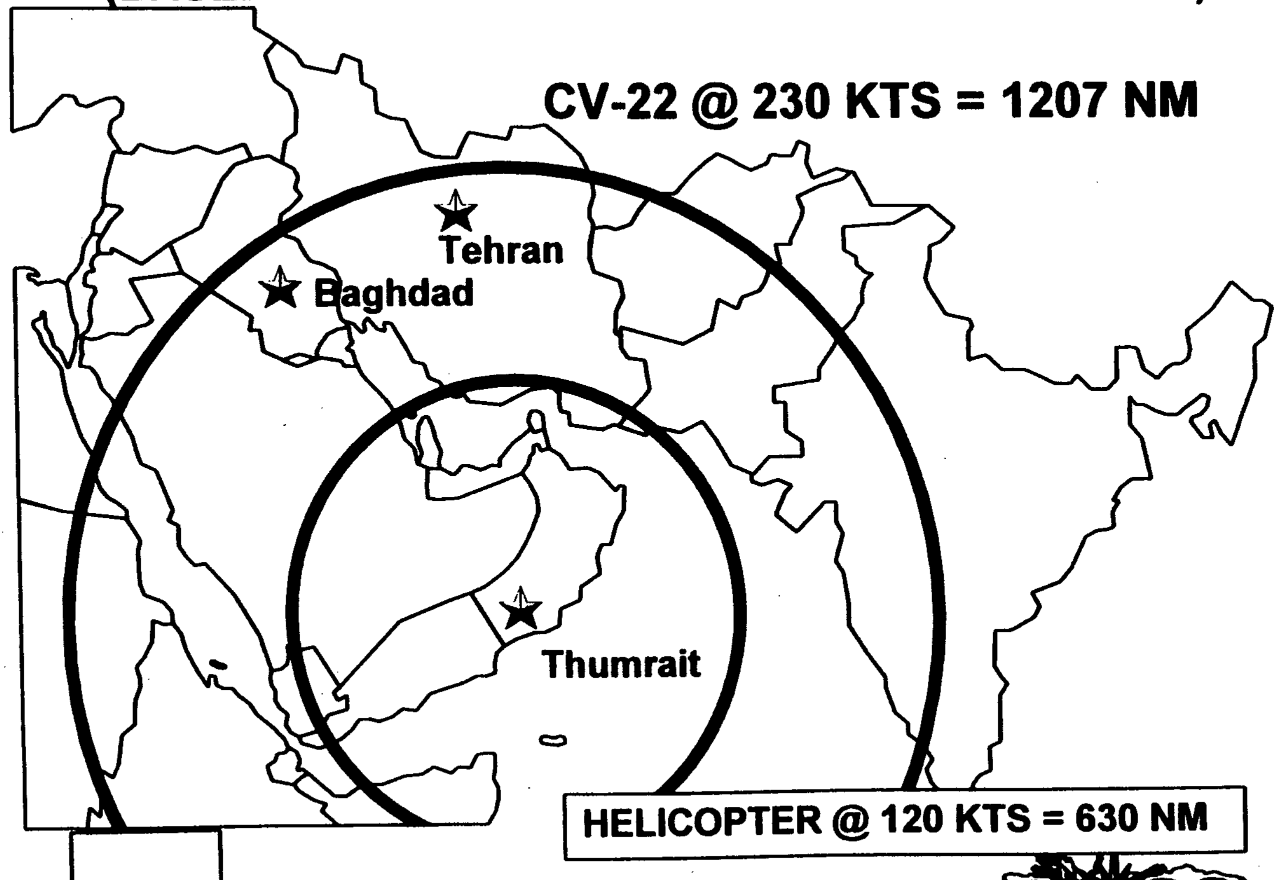
COMBAT RADIUS

(BASED ON TACTICAL AIRBORNE CREW DUTY DAY)



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UNCLASSIFIED

AC-130U SPECTRE GUNSHIP

INITIAL OPERATIONAL CAPABILITY
1 APRIL 1996

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AC-130U SPECTRE GUNSHIP

CURRENT STATUS

- 4TH SOS ACTIVATED 4 MAY 1995
- 12 U-MODELS ON RAMP AT HURLBURT
- 13TH AIRCRAFT IN MOD LINE; DUE BY FEB '97
- ROUTINELY GENERATING THREE TO FOUR SORTIES DAILY AT HRT
- U-MODEL IS POISED TO MEET WORLDWIDE DEMAND FOR GUNSHIPS

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AC-130U SPECTRE GUNSHIP

- EXERCISE FOAL EAGLE
- LOGISTICS SUPPORT CAPABILITY IMPROVING
  - SPARE PARTS FOR RADAR, TV, OTHER CRITICAL COMPONENTS ARE LONG POLES
  - COMBINATION OF ORGANIC BLUE-SUIT MX AND ROCKWELL CONTRACTOR SUPPORT

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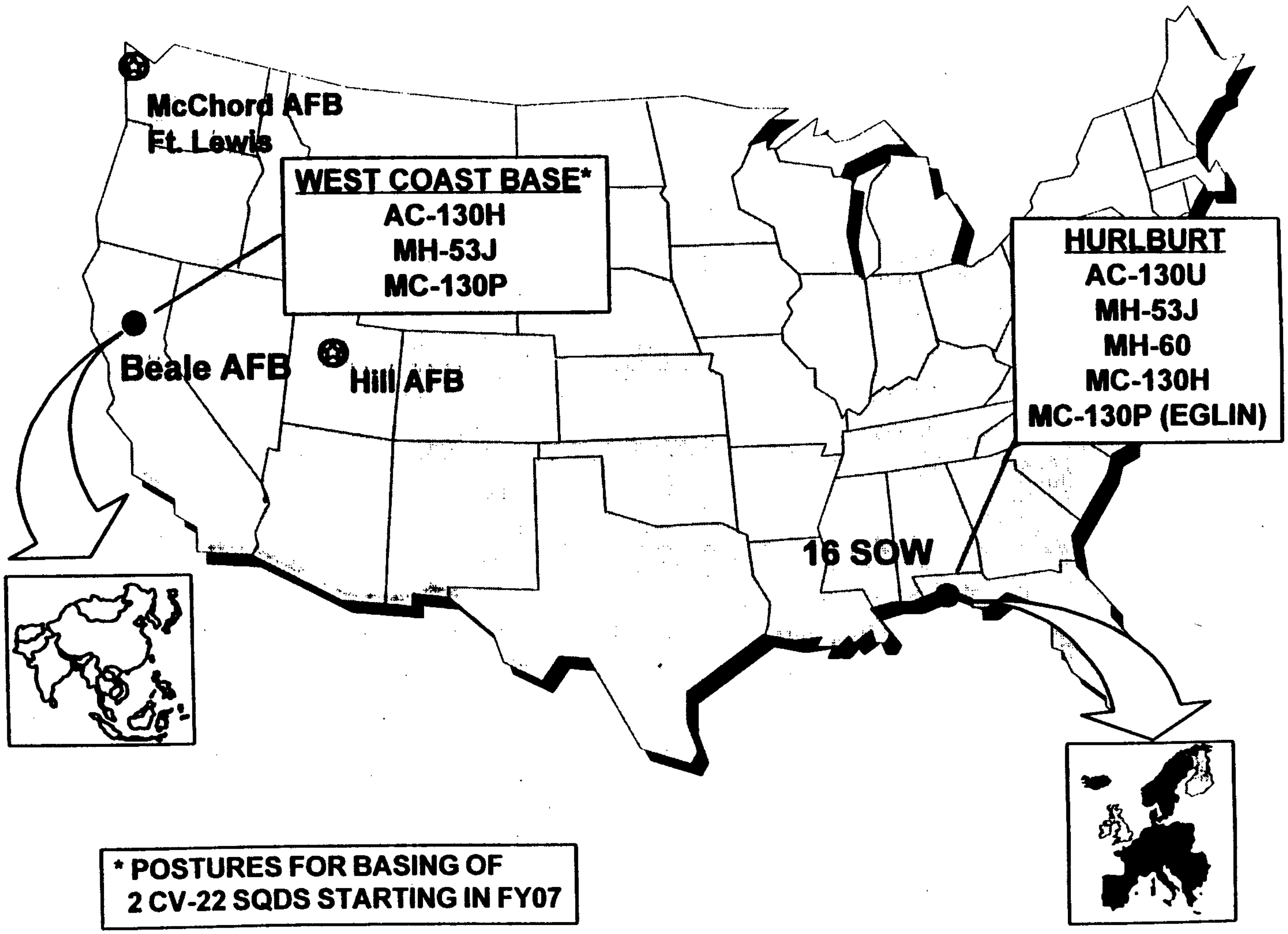
WEST COAST BASING



* POSTURES FOR BASING OF
2 CV-22 SQDS STARTING IN FY07

FOREIGN INTERNAL DEFENSE

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FOREIGN INTERNAL DEFENSE

- Oct 94 - 6 SOS Activation
- Apr 96 - 3 Teams (OADs)
  - PACOM/SOUTHCOM/CENTCOM
  - Officer & Enlisted
  - Aviators & Maintainers
- FY 97 - CENTCOM

AIR RESERVE COMPONENT (ARC) ISSUES

- RESERVE ISSUES (919 SOW)
  - TRAINING
  - ACCESSIBILITY/VOLUNTEERISM
  - IMPACT ON ACTIVE DUTY OPERATIONS TEMPO
- ANG ISSUES (193 SOW)
  - ACCESSIBILITY/VOLUNTEERISM
  - FUTURE DIRECTION

DEVELOP OUR PEOPLE

- COMMANDO EDGE
- OFFICER MANAGEMENT
  - RATED ARE SOF "CODED"
  - COMMANDO EAGLE BOARD
  - PLACING PME GRADUATES
  - LESS "STOVEPIPING" IN SOF -- MORE BACK TO "BIG AF"

RETURN TO BASICS

- NOVEMBER SURVEY
- UNIT SELF ASSESSMENT
- DISCIPLINE AND STANDARDS
- AIRCRAFT APPEARANCE

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SUMMARY

- CV-22: RETURN TO COURSE
- FOUR AC-130Us OPERATIONAL
- FID MISSION: GROWTH INDUSTRY
- RATED OFFICER MANAGEMENT HELPS IDENTIFY FUTURE SOF LEADERS

SUMMARY (CON'T)

- TRAINING IS OUR SEED CORN
- INCREASE GUARD AND RESERVE UTILIZATION